Nottingham City Council



2021 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

June 2021

Nottingham City Council

Information	Nottingham City Council Details
Local Authority Officer	Richard Taylor
Department	Resident's Services (Environmental Health and Safer Places team)
Address	Nottingham City Council, Loxley House, Station Street, Nottingham NG2 3NG
Telephone	0115 9152020
E-mail	richard.taylor@nottinghamcity.gov.uk
Report Reference Number	NottinghamCityASR2021
Date	June 2021

Executive Summary: Air Quality in Our Area

Air Quality in Nottingham City Council's administrative area

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas.[1,2]

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages3, with a total estimated healthcare cost to the NHS and social care of £157 million in 20174.

Air pollution is defined as a mixture of gases and particles that have been emitted into the atmosphere by natural and human-made processes.

The combustion of fossil and other carbon based fuels such as coal, gas, petrol, diesel and wood are the most significant sources of the key pollutants of concern: nitrogen oxides, particles and sulphur dioxide; and also carbon dioxide, a key greenhouse gas.

In Nottingham the main sources of urban nitrogen dioxide (NO_2) are natural gas fired heating/hot water systems and boilers (industrial, commercial and domestic sources) and motor vehicles. Furthermore, in some locations in Nottingham, particularly near busy roads, diffusion tube monitoring indicates concentrations of NO_2 might exceed the annual mean Air Quality Objective (AQO) of 40 ug/m3.

The largest local contributors to ambient concentrations of particulate matter (PM_{10}, $PM_{2.5}$, $PM_{0.1}$) are road transport; diesel engine vehicles, tyre, brake, and road surface wear, and the burning of solid fuels such as coal-based 'smokeless fuels' and wood.

---

1 Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

2 Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

3 Defra. Air quality appraisal: damage cost guidance, July 2020

4 Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

Nottingham City Council

Air quality modelling indicates that the majority of Nottingham's fine particulate air pollution ($PM_{2.5}$ and smaller) comes from sources outside the City, and contains a proportion of secondary particles formed by chemical reactions between air pollutants such as ammonia, sulphur dioxide and nitrogen dioxide.

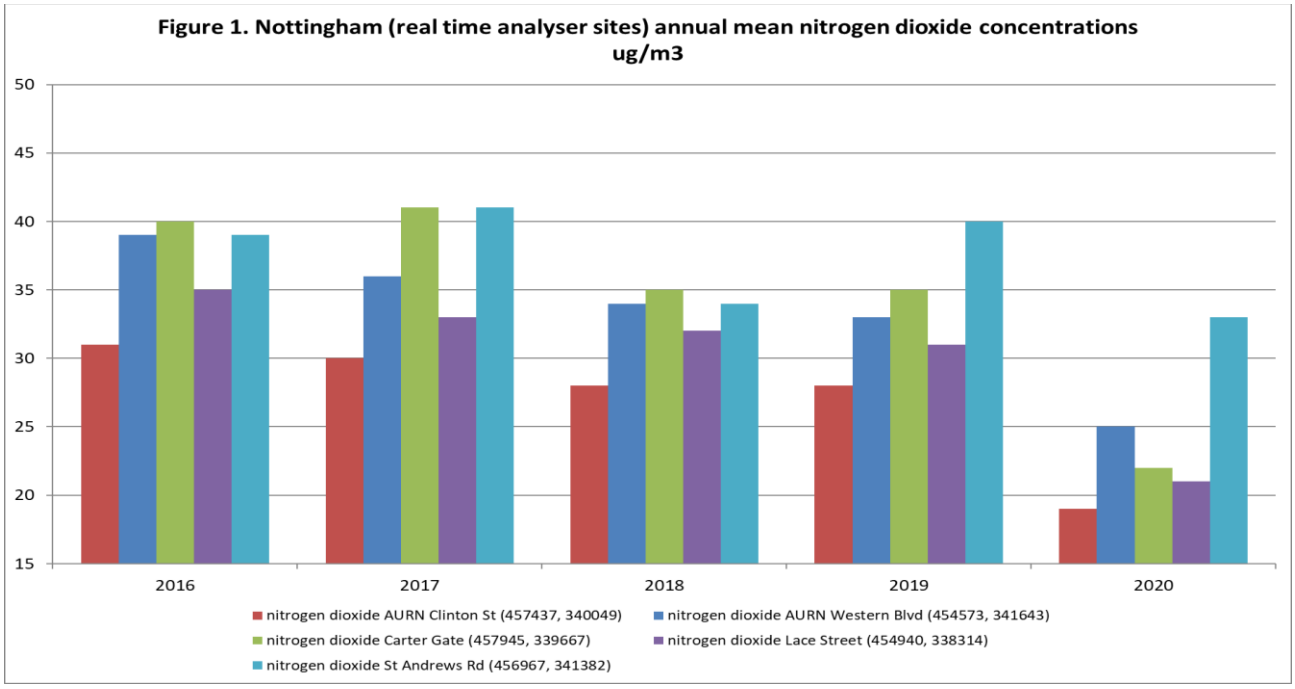
Air Quality Monitoring data 2020

As Nottingham has an AQMA for NO_2 it is required to carry out NO_2 monitoring and uses real time analysers and nitrogen dioxide diffusion tubes to do this.

DEFRA operates two AURN stations (for the Nottingham 'Agglomeration'), monitoring a range of pollutants of concern. Monitoring data from Nottingham City Council's 3 RTAs and the Clinton Street East and Western Boulevard AURN stations show NO2 concentrations were below the air quality objective (Figure 1.)

The Covid-19 pandemic and national action to prevent/minimise transmission including 'lockdowns' reduced emissions from road transport and other commercial activity, particularly the office, retail, leisure and hospitality sector, a significant proportion of the commercial activity in Nottingham's city centre.

It is therefore unsurprising that the 2020 NO_2 real time air quality monitoring data show a continuing downward trend in NO_2 concentrations at all four locations.



Nottingham's network of 50 diffusion tubes (38 individual locations), although only indicative of NO_2 concentrations, recorded lower annual mean concentrations at 34 sites when compared to all previous years monitored data.

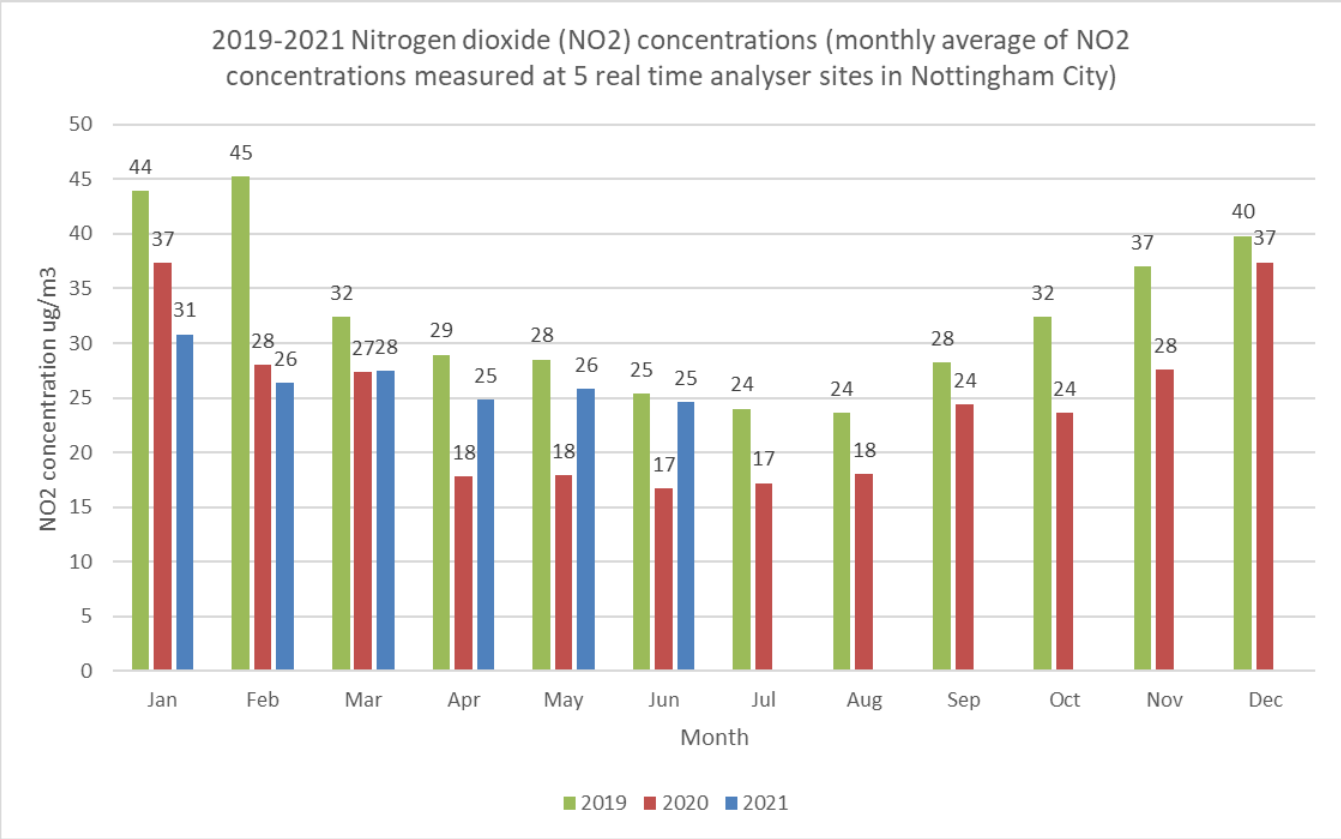
When a local bias adjustment factor is applied to the NO_2 concentrations (measured by the diffusion tubes) only four locations exceeded the annual mean AQO in 2020, compared to 18 locations in 2019 (see appendix C re use of national/local bias adjustment).

Latest Air Quality Monitoring Data (January 2021 – June 2020).

It has been widely reported that the international and national response to the coronavirus pandemic and its economic impact has resulted in reductions in CO_2 emissions and the co-pollutants of concern: NO_2 and particles. The noticeable improvement in local air quality in major cities throughout the UK has also been widely reported by the media.

It is likely that the impact of lock downs; reduced commuter emissions (as many people started working from home where possible) and almost no activity in the leisure and hospitality sector, have played a significant role in this.

Fig 2.



Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

Nottingham City Council

The 2019 Clean Air Strategy[5] sets out the case for action, with goals even more ambitious than EU requirements to reduce exposure to harmful pollutants. The Road to Zero[6] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

To raise the profile of air quality issues and its impact on health a Joint Strategic Needs Assessment was undertaken in 2015 resulting in the Air Quality and Health chapter of the JSNA. The chapter identified the key health issues, links to the Public Health Outcome Framework indicators (originally 3.01, now D01) and opportunities and synergies from links to a range of activities with improved health outcomes that reduce emissions of air pollution.

https://nottinghaminsight.org.uk/search?q=JSNA%20air%20quality

https://www.nottinghaminsight.org.uk/d/aAXKECw

The chapter was updated in 2019

https://www.nottinghaminsight.org.uk/d/aXx6DuH

Nottingham City Council pledge to reduce air pollution

Nottingham City Council is committed to improving air quality by cutting Nitrogen Dioxide and particulate pollution by 20% compared to 2018 (average concentrations of DEFRAs City Centre and Western Boulevard AURN sites).

https://www.nottinghamcity.gov.uk/media/2215620/nccplan19-web.pdf

(Note. The Council Plan is currently being revised but the 20% reduction remains a target).

Nottingham City Council aims to achieve this by the range of strategies, plans and activity outlined below.

5 Defra. Clean Air Strategy, 2019

6 DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Nottingham City Council

Nottingham Local Plan Part 1 and 2

Nottingham City Council has been working to improve air quality by reducing emissions of CO_2, NO_x/NO_2 and particles (PM_{10}, $PM_{2.5}$) by increasing energy efficiency across Nottingham City Council and Nottingham City Homes building stock, and investing in alternative energy generation.

Nottingham City Council's Land and Planning Policies Development Plan Document (Local Plan Part 2) which was in development at the time of publication of the ASR 2019 was adopted in January 2020.

It supports the wider Broxtowe Borough, Gedling Borough and Nottingham City Aligned Core Strategy. The Core Strategy details policies and objectives) of which the majority directly address or contribute towards improving air quality e.g.

i) Environmentally responsible development addressing climate change

ii) High quality new housing

v) Regeneration

viii) Health and wellbeing

x) Excellent transport systems and reducing the need to travel

xi) Protecting and improving natural assets

xii) Timely and viable infrastructure

https://www.nottinghamcity.gov.uk/information-for-business/planning-and-building-control/planning-policy/the-local-plan-and-planning-policy/the-adopted-local-plan/

Local Plan to Improve Air Quality in Nottingham (Action plan to reduce NO2 concentrations in locations at risk of infraction of EU limit values).

The main element of this air quality action plan, which was the retrofit of approximately 185 Euro V emission standard Nottingham City Transport buses with NO2 abatement technology to bring them up to Euro VI emission standard and the accelerated introduction of lower NO_2 emissions Bio-gas buses, was substantially completed by February 2020.

https://www.nottinghaminsight.org.uk/d/aBFPtBx

A significant proportion of the buses operating on the roads where infraction of the EU limit NO2 annual mean was predicted were upgraded by August 2019. The reduction in NOx/NO2 emissions and ambient NO2 concentrations were calculated, submitted to and, provisionally accepted by, DEFRA in August 2019.

Nottingham City Council

The second element of the plan, Nottingham City Council's revised Hackney Carriage and Private Hire Vehicle Strategy 2017-2020 designed to transition the fleet to Euro VI compliant taxi's from January 2020, and for a minimum of 40% of the HC and 25% of the Private Hire fleet to be Ultra Low Emission Vehicles has been implemented and is progressing. https://nottinghaminsight.org.uk/d/aBFPtrI

Nottingham and Nottinghamshire Air Quality Strategy

In November 2019 Nottingham and Nottinghamshire completed the review of their joint Air Quality Strategy and each Council's respective Health and Wellbeing Boards subsequently approved the drafts. The two versions of the Strategy, an interactive webpage and the more detailed strategy document, are available to download from each Council's website (search on-line for Nottingham and Nottinghamshire Air Quality Strategy).

The strategy draws together work by local authorities, police, fire and rescue services, NHS trusts, Environment Agency and Highway's England to develop, promote and support activity within their own organisations and complement each other to reduce harmful emissions from their activity, estate, staff and customers/service users.
https://www.nottinghaminsight.org.uk/d/aYjleqG

Air Quality and Emissions Mitigation – Guidance for Developers 2019 (draft)

Nottingham City Council is working to transpose the draft supplementary planning document, developed in partnership with East Midlands Air Quality Network, into an easy to follow guide and menu for developers in Nottingham to use. The guidance will enable developers to develop sites whilst minimising air pollution and carbon emissions from the development over its lifetime.

https://www.nottinghaminsight.org.uk/d/aavR2kmH

Carbon Neutral Action Plan

This plan builds on Nottingham 2028 Carbon Neutral Charter by setting out high-level objectives in order to achieve a resilient and carbon neutral Nottingham by 2028.

Nottingham's approach to sustainable carbon neutrality will integrate carbon reduction with sustainability and an ambition to identify and realise multiple benefits, termed co-benefits.

Co-benefits are deliberate or incidental positive outcomes across a range of other areas in addition to the central aim of an intervention. An example of a co-benefit is moving towards more active travel to tackle air-quality also has benefits for health from exercise and mental wellbeing, and reducing carbon emissions.

The approach encompasses all current and foreseeable emission sources and will reduce or negate entirely the combustion of carbon based fuels and, in turn, will reduce or negate emissions of NOx/NO2 and particles and other combustion by products.

https://www.nottinghamcity.gov.uk/cn2028

Carbon Neutral Supplementary Planning Document (draft)

In accordance with the Council's agreed Action Plan to achieve Carbon Neutrality by 2028, Planning Policy is currently preparing a supplementary planning document to provide detailed guidance on the range of measures possible to reduce Carbon in new residential and commercial development proposals. It will supplement existing Planning Policies as contained in the Nottingham City Aligned Core Strategy (2014) and the Local Plan Part 2 and highlight the Councils agreed targets.

Taking into consideration the policy context and best practice examples, it is anticipated that this SPD will firstly; provide guidance in relation to energy efficiency, renewable energy and sustainable design and construction and secondly; present a Carbon Neutrality checklist for applicants to demonstrate compliance with the policy approach.

Clear Zone (in development)

Although Nottingham City was not required to introduce a Clean Air Zone it has continued to review practicable options and measures to encourage and facilitate the switch to ultra-low emission vehicles travelling through and operating in the City Centre. This project is still in development with plans to introduce it late 2020. The City Centre Clear Zone will be modified to ensure only the cleanest vehicles will be able to access the city centre by introducing a permit scheme with emissions based criteria.

Benefits include:-

- Encourage the uptake of cleaner vehicles that service the heart of the city centre
- Support the Council's Plan to reduce the level of NO2 in the City and moving towards Carbon Neutral City 2028
- Improve the pedestrian environment, more people wanting to come to the city centre for shopping and leisure
- Reducing illegal trading practices by private hire vehicles; increasing bus punctuality and reducing congestion

Nottingham City Council

- Improve bus journey times and reliability by reducing unnecessary traffic in the City Centre

Go Ultra Low Nottingham programme

Through our Go Ultra Low Nottingham project we are helping to support uptake for electric cars and other low emission vehicles across the city. Our vision is for Nottingham to become an exemplar for low emission vehicles, spanning private cars, vans, buses, taxis and commercial fleets as a core part of our sustainable transport system.

Nottingham has been named one of the UK's first Go Ultra Low Cities. £6.1m funding awarded by the Office for Low Emission Vehicles has introduced a range of innovative projects to support the uptake in Ultra Low Emission Vehicles (ULEVs).

https://www.transportnottingham.com/driving/ultra-low-emission-vehicles/

Nottingham - Derby Access Fund

A comprehensive package of sustainable travel behaviour change measures to support capital infrastructure investment in Nottingham and Derby building on local good practice.

Objectives:

Improve air quality to support the introduction of Clean Air Zones or similar restricted vehicular access areas.

Embed sustainable and active travel cultures in our businesses and communities

Improve access to work and jobs

https://www.nottinghamshire.gov.uk/media/117257/nottinghamderbyaccessfundbid.pdf

Conclusions and Priorities

Air pollution remains a concern to Nottingham City Council, its citizens and businesses. There appears to be greater awareness and individual citizen experiences of both localised air pollution problems and a noticed reduction in air pollution as a result of the Covid-19 lockdown.

2020's monitoring generally shows a larger reduction in the number of diffusion tube monitoring sites exceeding the annual mean air quality objective (when applying the local bias adjustment factor) from 18 down to 4, and a reduction in monitored NO2

concentrations at the 3 real time analyser sites. All RTA sites remained below the NO2 annual mean air quality objective of 40 ug/m3.

Priorities to improve air quality

The local (and conurbation wide) priority to improve air quality continues to be how to reduce levels of nitrogen dioxide, and identify and implement practicable measures to reduce particle emissions and concentrations in the City area.

The local priorities and challenges to improve air quality in Nottingham and reduce emissions are:-

i. Increase activity to raise awareness of air pollution and its health impacts,

ii. Enforce the Road Traffic (Vehicle Emissions) (Fixed Penalty) (England) Regulations 2002, and issue Fixed Penalty Notices to drivers unnecessarily idling a stationary vehicles' engine.

iii. Go Ultra Low Nottingham – continues to secure funding to promote and support a range of initiatives and projects to facilitate the take-up of Ultra Low Emission Vehicles (ULEV) in Nottingham,

iv. Complete the feasibility study into a low emission/ clear zone for the City Centre and identify/secure funding for implementation,

v. Encourage all bus operators to implement a retrofit or replacement programme for older polluting buses,

vi. Continue work with Nottingham's taxi companies to introduce low and zero emission vehicles.

vii. Integrate East Midlands Air Quality Network Air Quality and Emission Mitigation guidance as Supplementary Planning Guidance in the Local Plan.

viii. Further develop plans and secure funding for extension of Nottingham's Tram network (lines 4 and 5),

ix. Continue to work with major private and public sector employers to review vehicle use to reduce emissions,

x. Continue to roll-out/improve energy efficiency in Nottingham City Council's housing stock, as and when funding permits,

xi. Promote energy efficiency and the transition to/installation of alternative technologies that significantly reduce/negate NO2/NOx emissions in the commercial/industrial sector,

Nottingham City Council

xii. Identify opportunities and secure further funding to transition Nottingham City Council commercial vehicle fleet to ULEV,

xiii. Identify and implement practicable local solutions to reduce particle emissions and concentrations.

Local Engagement and How to get Involved

What is the Council doing to reduce emissions?

Nottingham City Council is concerned about air pollution, climate change, and air quality and recognises that these issues are complex and interlinked.

The Council's strategies and action on climate change and public transport have reduced CO_2 emissions and air pollution in the City, but the Council recognises it is necessary to go much further to reduce emissions from the range of sources that generate particles and nitrogen dioxide and impact on health.

Portfolio Holders Air Quality Steering Group

This group comprises Nottingham City Council's Portfolio Holder for Energy and Environment (including Air Quality), Corporate Director of Development, Director of Transport, Director of Public Health, Head of Environmental Health and Safer Housing, and officers from their teams. It develops strategies, policies and implementation plans to deliver improved air quality in Nottingham.

Health and Wellbeing Board

This group comprises Nottingham City Council and a large number of organisations, including Primary Health Care commissioners and providers, Registered Social Landlords, and third sector organisations.

http://www.healthynottingham.co.uk/

In September 2020 the Board approved the revised Nottingham and Nottinghamshire Air Quality Strategy. https://www.nottinghaminsight.org.uk/d/aaJK0SBf

Public health Steering Group

This group comprises officers from Public Health England, Nottingham City Council and Nottinghamshire County Council Public Health teams, the NHS, Nottingham City Council's

Environmental Health service, and a representative of Nottinghamshire's district Environmental Health services.

The group identifies current and emerging public/environmental health issues that require joint and concerted action to resolve, and prepares reports and chapters for the Joint Strategic Needs Assessment, used to inform the Health and Wellbeing Board and its formulation of Strategy.

Nottingham Green Partnership

Nottingham Green Partnership is a wide range of organisations in the public, private and voluntary sectors that are working together to reduce the city's environmental impact. It recognises the environmental issues that affect Nottingham and its citizens, and aims to deliver actions that will reduce our reliance on fossil fuels, increase resilience and improve quality of life.

What can I do to improve air quality?

When burned in air, carbon containing fuels e.g. wood and fossil fuels, emit carbon dioxide, nitrogen oxides (NOx) – nitrogen oxide (NO) and nitrogen dioxide (NO_2), and particles (including PM_{10} and $PM_{2.5}$). Although it does not affect local air quality, carbon dioxide is a greenhouse gas and contributes to climate change. Nitrogen dioxide and particles adversely affect local air quality therefore reducing emissions of these pollutants will improve air quality.

Measures that help to reduce emissions of air pollution and thereby improve air quality:-

Travel choices: walking, cycling, public transport, and journey/travel planning

Walking and cycling, also known as 'active travel', have mental and physical health benefits in addition to reducing air pollution. Follow the links below for more information:

Walking in Nottingham: https://www.nottinghamcity.gov.uk/information-for-residents/transport-parking-and-streets/rights-of-way-walking-and-cycling/walking-in-nottingham/ and http://walkit.com/

Cycling in Nottingham: http://www.transportnottingham.com/cycling/

Nottingham has a high quality public transport network located within the City, including the NET tram network as well as an established bus network.

Nottingham City Council

Nottingham NET: http://www.thetram.net/

Nottingham City Transport: https://www.nctx.co.uk/

Trent Barton: https://www.trentbarton.co.uk/

Stagecoach: https://stagecoachbus.com

Nottingham Car club: https://www.transportnottingham.com/driving/car-club/

A car club is a membership scheme that offers pay-as-you-go basis car rental, At the end of the journey you return your car to its dedicated on-street car club parking space. Nottingham currently has a network for 14 car club vehicles in 11 locations.

Energy efficiency:

We use energy in the form of electricity or natural gas to heat our homes, cook and power electrical equipment. Insulating our homes and using energy efficient appliances reduces energy consumption and emissions, both at power stations and locally from domestic gas boilers and gas cookers.

Visit http://www.energysavingtrust.org.uk/ for ideas on home to save energy and money.

Clean Air Day

On the 17th June 2021 Nottingham, together with other Cities and organisations across the UK, participated in the fifth (National) Clean Air Day. The aim of the day was to raise awareness about air pollution, what people can do, and publicise via social media what people did, to reduce emissions and their exposure to air pollution.

Please visit https://www.cleanairday.org.uk/ for more information.

Although promoted as a single 'Clean Air Day', the event is to highlight the year round issue of air pollution and its effects on health, enable Citizens identify what they can do on Clean Air Day and in the future to reduce personal exposure to air pollution, reduce emissions, and improve air quality.

To demonstrate and promote ongoing activity to improve air quality participants have been using the twitter hashtag #cleanaireveryday to maintain awareness and publicise activity to reduce emission and spread information on how to reduce exposure.

Nottingham City Council

Visit Tweets with replies by Environmental Health (@Envhealthnottm) / Twitter and scroll down to June the 17th for our contribution.

World Car Free Day

On the 22nd September 2019 Nottingham joined with many cities around the world to promote and celebrate World Car Free Day.

This year WCFD is Wednesday 22nd September 2021 and, if resources allow, Nottingham City Council intends to promote the day.

For more information, to comment or raise your concerns about air pollution and air quality please visit

https://www.nottinghamcity.gov.uk/information-for-business/environmental-health-and-safer-housing/environmental-health-and-safer-places/

Table of Contents

Executive Summary: Air Quality in Our Area i
Air Quality in Nottingham City Council's administrative area i
Actions to Improve Air Quality iii
Conclusions and Priorities viii
Local Engagement and How to get Involved x
1 Local Air Quality Management 1
2 Actions to Improve Air Quality 2
2.1 Air Quality Management Areas 2
2.2 Progress and Impact of Measures to address Air Quality in the City of Nottingham 5
2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations 17
3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance 19
3.1 Summary of Monitoring Undertaken 19
3.1.1 Automatic Monitoring Sites 19
3.1.2 Non-Automatic Monitoring Sites 19
3.2 Individual Pollutants 20
3.2.1 Nitrogen Dioxide (NO_2) 20
3.2.2 Particulate Matter (PM_{10}) 21
3.2.3 Particulate Matter ($PM_{2.5}$) 21
3.2.4 Sulphur Dioxide (SO_2) 21
Appendix A: Monitoring Results 22
Appendix B: Full Monthly Diffusion Tube Results for 2020 41
Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC 44
New or Changed Sources Identified Within Nottingham City Council During 2020 44
Additional Air Quality Works Undertaken by Nottingham City Council During 2020 44
QA/QC of Diffusion Tube Monitoring 44
Diffusion Tube Annualisation 46
Diffusion Tube Bias Adjustment Factors 47
NO_2 Fall-off with Distance from the Road 47
QA/QC of Automatic Monitoring 48
Automatic Monitoring Annualisation 49
NO_2 Fall-off with Distance from the Road 49
Appendix D: Map(s) of Monitoring Locations and AQMAs 51
Appendix E: Summary of Air Quality Objectives in England 53
Appendix F: Impact of COVID-19 upon LAQM 54
Impacts of COVID-19 on Air Quality within City of Nottingham area 55
Opportunities Presented by COVID-19 upon LAQM within City of Nottingham area 56

Challenges and Constraints Imposed by COVID-19 upon LAQM within City of Nottingham's area 56

Glossary of Terms 58

References 59

Figures

Figure A.1 – Trends in Annual Mean NO_2 Concentrations....33
Figure A.3 – Trends in Annual Mean PM_{10} Concentrations....36
Figure A.5 – Trends in Annual Mean $PM_{2.5}$ Concentrations....39

Figure D.1 – Map of Non-Automatic Monitoring Site....51

Tables

Table 2.1 – Declared Air Quality Management Areas....3
Table 2.2 – Progress on Measures to Improve Air Quality....7

Table A.1 – Details of Automatic Monitoring Sites....22
Table A.2 – Details of Non-Automatic Monitoring Sites....23
Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring ($\mu g/m^3$)....28
Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring ($\mu g/m^3$)....29
Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200$\mu g/m^3$....34
Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)....35
Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50$\mu g/m^3$....37
Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results ($\mu g/m^3$)....38
Table A.9 – SO_2 2020 Monitoring Results, Number of Relevant Instances....40

Table B.1 – NO_2 2020 Diffusion Tube Results ($\mu g/m^3$)....41

Table C.1 – Bias Adjustment Factor....47
Table C.2 – Annualisation Summary (concentrations presented in $\mu g/m^3$)....50
Table C.3 – Local Bias Adjustment Calculation....50
Table C.4 – NO_2 Fall off With Distance Calculations (concentrations presented in $\mu g/m^3$)....50

Table E.1 – Air Quality Objectives in England....53

Table F 1 – Impact Matrix....57

1 Local Air Quality Management

This report provides an overview of air quality in the City of Nottingham during 2020. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Nottingham City Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1.

2 Actions to Improve Air Quality

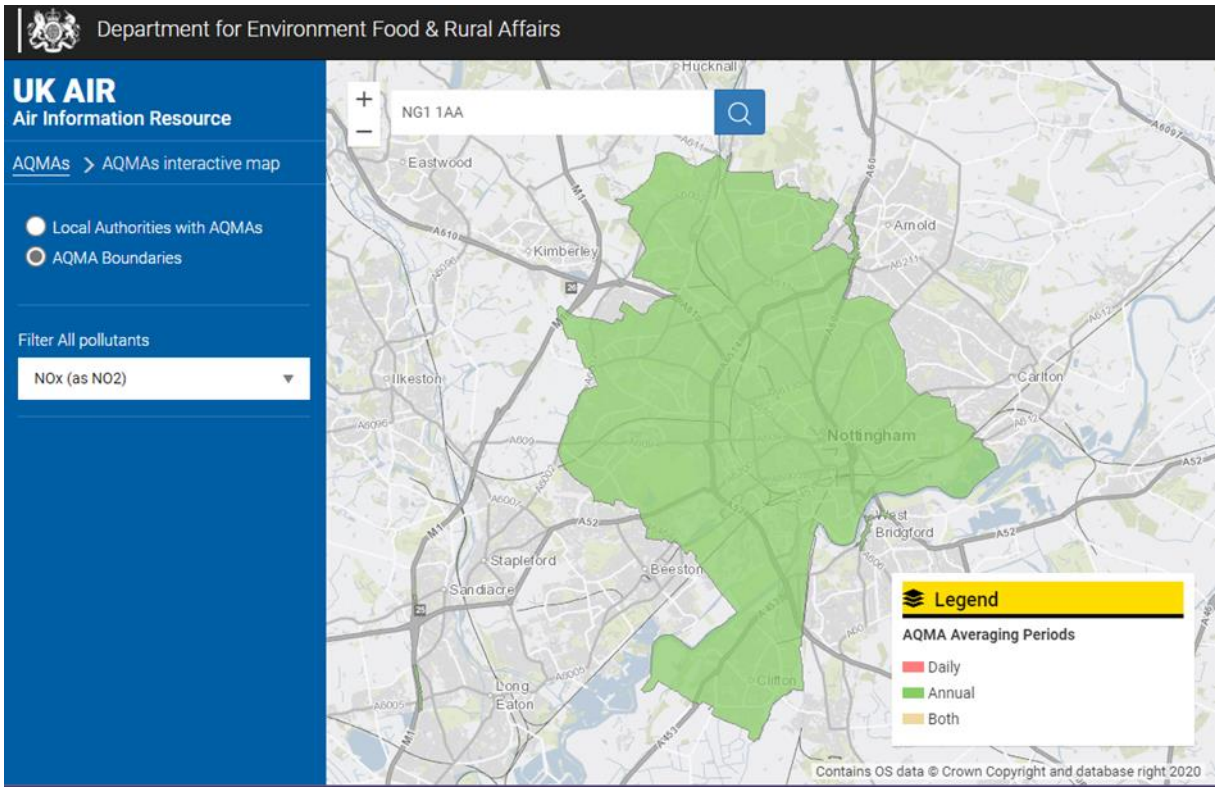
2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by Nottingham City Council for NO_2 can be found in **Error! Reference source not found.**. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=188

Further information detailing declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/maps/

Figure 2 – Nottingham City Council AQMA No. 2.



Nottingham City Council

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA No.2	Declared 2002, Amended 2010 and 2019	NO2 Annual Mean (40 ug/m3)	The AQMA covers the entire administrative area of Nottingham City Council.	NO	41µg/m^3 (St Andrew's Road)	33 µg/m^3	LTP Implementation Plans 2010, 2015-18, 2016-19, 2017-20, 2018-21 and 2019-22 Nottingham City AQAP 2018 draft	http://aqma.defra.gov.uk/action-plans/NottCC%20AQAP%202010.pdf https://www.nottinghaminsight.org.uk/Document-Library/Document-Library/aBFyzqe and https://www.nottinghaminsight.org.uk/search?q=transport+plan and https://www.nottinghaminsight.org.uk/search?q=air+quality+action+plan
AQMA No.2	As above	NO2 Annual Mean (40 ug/m3)	As above	No	44 µg/m^3 (Carter Gate)	22 µg/m^3	As above	As above

Nottingham City Council

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
AQMA No.2	Declared 2002, Amended 2010 and 2019	NO2 Annual Mean (40 ug/m3)	As above	No	42 µg/m^3 (Lace Street)	21 µg/m^3	As above	As above
AQMA No.2	As above	NO2 Annual Mean (40 ug/m3)	As above	No	33 µg/m^3 (AURN Clinton Street East)	19 µg/m^3	As above	As above
AQMA No.2	As above	NO2 Annual Mean (40 ug/m3)	As above	No	42µg/m^3 (AURN Western Boulevard)	25 µg/m^3	As above	As above

☒ **Nottingham City Council confirm the information on UK-Air regarding their AQMA(s) is up to date.**

☒ **Nottingham City Council confirm that all current AQAPs have been submitted to Defra** (AQAP Consolidation exercise 1/2021)**.**

2.2 Progress and Impact of Measures to address Air Quality in the City of Nottingham

Defra's appraisal of Nottingham City Council's 2020 ASR can be downloaded via

https://www.nottinghaminsight.org.uk/f/63682/Library/Environment/Air-Quality/

(scroll down to locate and download 'Nottingham City Council Appraisal Letter 2020')

In summary it concluded 'On the basis of the evidence provided by the local authority the conclusions reached are acceptable for all sources and pollutants.'

Specific issues raised in the appraisal related to:-

1. the mention of the Public Health Outcomes Framework indicator for air quality which, although specifically referenced in other Council strategies and reports on air quality and health (i.e. NCC JSNA Air Quality and Health 2015 and 2019), it is now specifically mentioned in this year's ASR,
2. the request for the entire range of potential Air Quality measures (as detailed within the ASR template) to be included in table 2.2.
3. a request for more detailed maps. A link and instructions are provided to facilitate the use of the Council's publicly accessible GIS, where all monitoring locations can be viewed at a scale of 1:500.

As in previous years following receipt of this year's appraisal the ASR will be amended and available to view at

https://www.nottinghaminsight.org.uk/f/63682/Library/Environment/Air-Quality/

Nottingham City Council has taken forward a number of direct measures during the current reporting year of 2020 in pursuit of improving local air quality.

Details of all measures completed, in progress or planned are set out in Table 2.2. Over 30 measures are included within Table 2.2, with the type of measure and the progress Nottingham City Council have made during the reporting year of 2020 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective Action Plans:-

https://www.nottinghaminsight.org.uk/search?q=transport

https://www.nottinghaminsight.org.uk/f/aAXNRad

The Nottingham Local Transport Plan now encompasses 2011 to 2026:

https://www.nottinghaminsight.org.uk/d/aapQXtBh

Local Transport Plan Implementation Plan 2019-2022

https://www.nottinghaminsight.org.uk/d/aYivUAT

Nottingham City Council expects the measures outlined in Table 2.2 to be completed over the course of the next reporting year.

Nottingham City Council anticipates that the measures stated above and in Table 2.2 will maintain compliance in the locations identified in

https://consult.defra.gov.uk/airquality/implementation-of-cazs/

https://www.gov.uk/government/publications/air-quality-in-the-uk-plan-to-reduce-nitrogen-dioxide-emissions

and encompassed by the variation of Nottingham City AQMA No.2.

Whilst the measures stated above and in Table 2.2 will contribute towards compliance, Nottingham City Council anticipates that further additional measures not yet prescribed may be required in subsequent years to maintain compliance and enable the revocation of Nottingham City AQMA No.2.

Nottingham City Council

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
NCC017	Nottingham City park and Ride sites	Alternatives to private vehicle use	Bus based Park & Ride	2019	2019	Nottingham City Council	Developers & highway infrastructure funding				Implemented https://www.nottinghamcity.gov.uk/information-for-residents/transport-parking-and-streets/parking-and-permits/park-and-ride/	Reduced vehicle emissions		Implemented and operational	
NCC018	Nottingham City Council staff car share	Alternatives to private vehicle use	Car & lift sharing schemes	-	2021	Nottingham City Council	N/A				Operational Nottingham City Council Staff Car Share community - part of the Liftshare network	Reduced vehicle emissions		Implemented and operational	
NCC019	Nottingham City Council Car Club	Alternatives to private vehicle use	Car Clubs	2014	2020	Nottingham City Council, Enterprise Car Hire	N/A				Operational Nottingham City Council Car Club - CoMoUK	Reduced vehicle emissions		Implemented and operational	
NCC020	Nottingham City Park and Ride sites	Alternatives to private vehicle use	Rail based Park & Ride			Network Rail, Nottingham Express transit					Implemented https://www.nottinghamcity.gov.uk/information-for-residents/transport-parking-and-streets/parking-and-permits/park-and-ride/	Reduced vehicle emissions		Implemented and operational	
NCC021	Nottingham City Electric Scooter rental trial	Alternatives to private vehicle use	Other Alternative transport mode low congestion	2020		Nottingham City Council, WIND scooters					https://www.transportnottingham.com/projects/escooters/			Trials ongoing	Misuse, pavement clutter affecting sight impaired.
		Environmental Permits	Introduction/increase of environment charges through permit systems and economic instruments	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Introduction/increase of environmental funding through permit systems and economic instruments	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Large Combustion Plant Permits and National Plans going beyond BAT	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Measures to reduce pollution through IPPC Permits going beyond BAT	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Other measure through permit	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
			systems and economic instruments												direction from lead departments: DEFRA and Treasury
		Environmental Permits	Tradable permit system through permit systems and economic instruments	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
		Environmental Permits	Other	-	-	DEFRA	DEFRA	-	-	-	-	-	-	-	Can only be implemented by direction from lead departments: DEFRA and Treasury
-	-	Freight and Delivery Management	Delivery and Service plans	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Freight Consolidation Centre	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Freight Partnerships for city centre deliveries	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Quiet & out of hours delivery	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Route Management Plans/ Strategic routing strategy for HGV's	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Freight and Delivery Management	Other	-	-	-	-	-	-	-	-	-	-	-	-
NCC 022	Air Quality Strategy for Nottingham and Nottinghamshire 2020-2030	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2020	2030	Nottingham City Council, Nottinghamshire County, Borough and District Councils. Nottm City and Notts County Health and Wellbeing Board members									
		Policy Guidance and Development Control	Low Emissions Strategy												
		Policy Guidance and Development Control	Other policy												

Nottingham City Council

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
NCC023	Draft East Midlands Air Quality Network Air Quality and Emissions Mitigation Guidance for Developers	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality			East Midlands Air Quality Network (East Midlands LAs - Env H, Planning & Transport, Public H, PHE	LA base budgets								
-	-	Policy Guidance and Development Control	Sustainable Procurement Guidance	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Emission control equipment for small and medium sized stationary combustion sources / replacement of combustion sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Low Emission Fuels for stationary and mobile sources in Public Procurement	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Other measure for low emission fuels for stationary and mobile sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Public Procurement of stationary combustion sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Regulations for fuel quality for low emission fuels for stationary and mobile sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Shift to installations using low emission fuels for stationary and mobile sources	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Plant	Other Policy	-	-	-	-	-	-	-	-	-	-	-	-
-	-	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low	-	-	-	-	-	-	-	-	-	-	-	-

Nottingham City Council

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
			emission vehicles												
NCC024	Nottingham City Centre Clear Zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)			Nottingham City Council								Feasibility studies being conducted	Funding to implement, enforcement
NCC025	Broadmarsh Car park dedicated EV charging spaces/floor	Promoting Low Emission Transport	Priority parking for LEVs	2020	2021	Nottingham City Council								Facility installed	
NCC002	Go Ultra Low Nottingham Programme	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	2015	2020	Led by Nottingham City Council. OLEV grant funding (Go Ultra Low Programme)	DEFRA						Project specific outputs	Project complete	Project complete but many initiatives being continued through FTZ and TCF (see below)
NCC026	Fleet Strategy	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2018		Led by Nottingham City Council	NCC, DEFRA				https://www.nottinghamevservices.co.uk/fleet/			Ongoing	
NCC011	CAZ additional measures	Promoting Low Emission Transport	Taxi emission incentives	2019	2021	Led by Nottingham City Council. Joint Air Quality Unit/	DEFRA						% Euro 6 and % ULEV private hire vehicles operating to strategy	Project complete	
NCC011a	City of Nottingham Age and	Promoting Low	Taxi Licensing conditions	2018	2021	Led by Nottingham City							Policy specific	Project complete	

Nottingham City Council

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
	specification Policies Relating to Hackney Carriage and Private Hire Vehicles	Emission Transport				Council. Joint Air Quality Unit /							outputs		
NCC016	Electric Van Experience	Promoting Low Emission Transport	Other Increase the number of businesses using Electric vehicles	2020		Nottingham City Council, local businesses	Highways England							Project underway	
NCC001	DEFRA Air Quality funding	Promoting Low Emission Transport	Other		2020/2021	Led by Nottingham City Council. Joint Air Quality Unit /	DEFRA						Project specific outputs	Initial works underway	-
NCC034	Covid-19 response Future Hybrid working project	Promoting Travel Alternatives	Encourage / Facilitate home-working		2021/2022	Nottingham City Council	NCC							Implemented as part of Covid-19 response.	Likely to achieve 40-60% reduction in office space requirements. Will reduce commuting using all modes.
NCC027	NCC Active travel Fund Measures	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure				DEFRA DfT				https://www.transportnottingham.com/projects/emergency-active-travel-fund-covid-19-measures/			ongoing	
NCC09a	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	Personalised Travel Planning	2021	2022	Nottingham City Council. DfT grant funding (Capability Fund)									

Nottingham City Council

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
NCC028	Nottingham Station Hub HUB	Promoting Travel Alternatives	Promote use of rail and inland waterways	2018		Nottingham City Council, Network Rail					Operational			Completed	
NCC028a	Transport Interchange and Integration BUS2	Promoting Travel Alternatives	Promote use of rail and inland waterways	2018			Midlands Connect, Developer contributions/ partnership working, Local Growth Fund, Transforming Cities Fund/Other								
NCC09b	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	Promotion of cycling	2021	2022	Nottingham City Council. DfT grant funding (Capability Fund)									
NCC09c	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	Promotion of walking	2021	2022	Nottingham City Council. DfT grant funding (Capability Fund)									
NCC09d	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	School Travel Plans	2021	2022	Nottingham City Council. DfT grant funding (Capability Fund)									
NCC09e	Smarter Travel Hubs / Continuity Fund	Promoting Travel Alternatives	Workplace Travel Planning	2021	2022	Nottingham City Council. DfT grant funding									

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
						(Capability Fund)									
NCC013	DfT Active Travel Measures	Promoting Travel Alternatives	Other Monitoring Cameras, Cycle Lanes, School Street Closures and Pop up Cycle Parking	2020	2021	NCC, DfT	DfT				Increase in Active travel			Project underway	
		Public Information	Via leaflets												
		Public Information	Via other mechanisms												
		Public Information	Via radio												
		Public Information	Via television												
NCC029	Aq data sharing	Public Information	Via the Internet	2018		NCC, AQMS	None				AQ information available on websites				
NCC030	Air Quality news	Public Information	Other	2018		NCC	None				Regular AQ updates and alerts on EH Twitter feed.				
NCC031	Anti-idling signs and campaigns	Traffic Management	Anti-idling enforcement	2019		NCC	None				Signage to discourage idling in identified problem areas				
		Traffic Management	Emission based parking or permit charges												
NCC032	NCC Active Travel Fund Measures	Traffic Management	Reduction of speed limits, 20mph zones		2023	NCC	DfT				Service user survey completed https://www.transportnottingham.com/projects/emergency-active-travel-fund-covid-19-measures/				
		Traffic Management	Road User Charging (RUC)/ Congestion charging												
NCC007	Southside Transport Strategy (Broadmarsh)	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access managem	2014/15 - 2015/16	2016 - 2023		Nottingham City Council. Funding from Local Growth Fund, LTP and prudential borrowing							Works to demolish car park finished in 2018. Further road space works planned to take	Large-scale regeneration project. High number of dependencies for the works

Nottingham City Council

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
			ent, Selective vehicle priority, bus priority, high vehicle occupancy lane											place in future years	
		Traffic Management	Testing Vehicle Emissions												
NCC033	Real Time camera enabled UTC	Traffic Management	UTC, Congestion management, traffic reduction			Nottingham City Council					Operational				
NCC003	Nottingham Workplace Parking Levy (WPL)	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	2011	2012 – ONWARDS to 2037	Nottingham City Council	WPL liable businesses				operational				
		Traffic Management	Other												
		Transport Planning and Infrastructure	Bus route improvements												
NCC010	Nottingham Enterprise Zone Sustainable Transport Package	Transport Planning and Infrastructure	Cycle network	2016-17	2018-21	Nottingham City Council. Funding from Local Growth Fund and developer contributions.					Operational			Completed	Delay to original scheme due to Network design refinements
NCC026	Nottingham Citycard cycles	Transport Planning and Infrastructure	Public cycle hire scheme	2015	2018	Nottingham City Council	WPL, DfT				Operational https://www.transportnottingham.com/cycling/hire-a-bike/			Operational	
NCC004	Midland Mainline Enhancements	Transport Planning and Infrastructure	Public transport improvements-interchanges stations	2016-17	2016-2023	Network Rail								Awaiting introduction of new rolling stock	Electrification cancelled. Uncertainty relating to

Nottingham City Council

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
			and services												enhancements on Midland Mainline. New rolling stock may contribute to improving air quality.
NCC012	CAZ additional measures	Transport Planning and Infrastructure	Other Bus retrofit project	2018	October 2021	Nottingham City Transport	DEFRA					1-6 ug/m3 City wide effect. Most pronounced in City Centre due to concentration of routes.		NCT Retrofit Project now complete, council now working other operators	NCT Retrofit now complete, Council now working with other operators to ensure their fleets meet the highest emission standards.
NCC014	Future Transport Zones	Transport and Planning Infrastructure	Other Mobility as a service Mobility hubs better use of data and electric vehicles	2020	2023		DfT							Project underway	Increase active travel and public transport use
NCC015	Transforming Cities Fund	Transport and Planning Infrastructure	Other Active Travel and Bus Priority Measures	2020	2023		DfT							Project underway	Increase active travel and public transport use
-	ECOstars	Vehicle Fleet Efficiency	Driver training and ECO driving aids	-	-	Gedling Borough Council on behalf of Nottinghamshire Local Authorities-	-	-	-	-	https://www.ecostars-uk.com/about-eco-stars/eco-stars-for-buses-vans-freight/public-sector/	Reduction in emission from improved driver behaviour in conurbation	-	Operational	Ecostars

Nottingham City Council

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
-	ECoStars	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	-		Gedling Borough Council on behalf of Nottinghamshire Local Authorities-					https://www.ecostars-uk.com/about-eco-stars/eco-stars-for-buses-vans-freight/public-sector/	Reduction in emission from improved driver behaviour in conurbation		Operational	Ecostars
NCC026	NCC CAZ additional measures	Vehicle Fleet Efficiency	Promoting Low Emission Public Transport												
NCC027		Vehicle Fleet Efficiency	Testing Vehicle Emissions												
		Vehicle Fleet Efficiency	Vehicle Retrofitting programmes												
		Vehicle Fleet Efficiency	Other												

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and/or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Nottingham City Council is implementing and considering the following measures to address PM2.5:

Existing measures are focused on:-

i. reducing emissions from transport by constraining traffic growth and encouraging/facilitating walking, cycling and use of public transport and

ii. on-going regulatory activity re Permitted Processes, ensuring compliance with the City's existing Smoke Control Orders, discouraging bonfires and uncontrolled burning, and ensuring construction/demolition activity implement dust minimisation measures.

Additional measures being considered include:-

i. Reducing emissions from non-vehicle fixed and mobile sources and

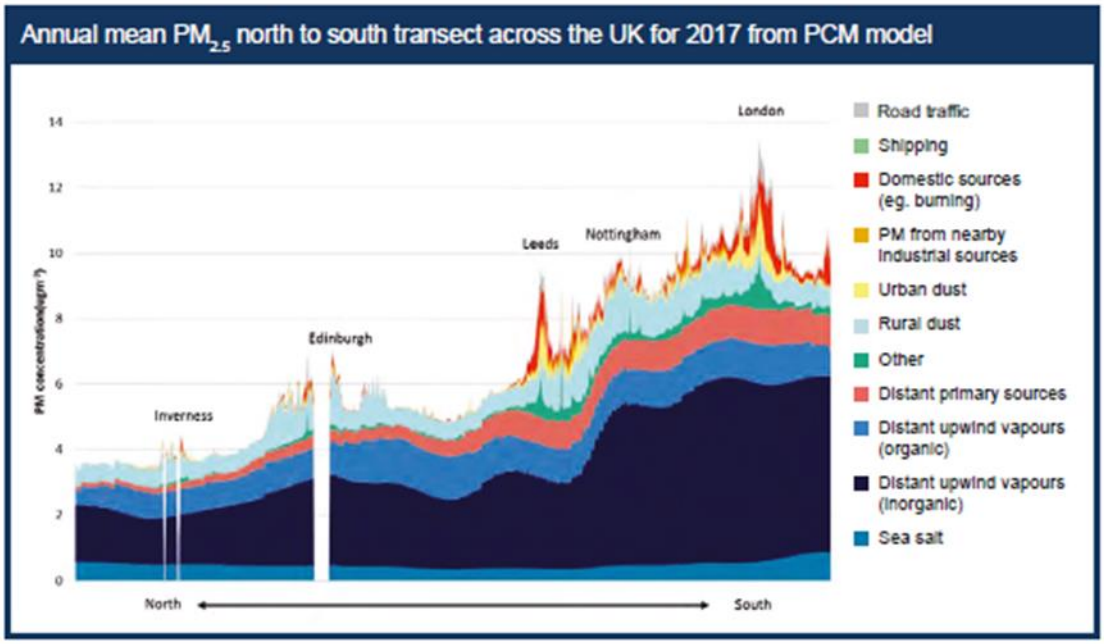
ii. Planting to reduce weathering/entrainment of soil/surface particles and increasing green surface area for adsorption/impingement/entrapment of particles by foliage.

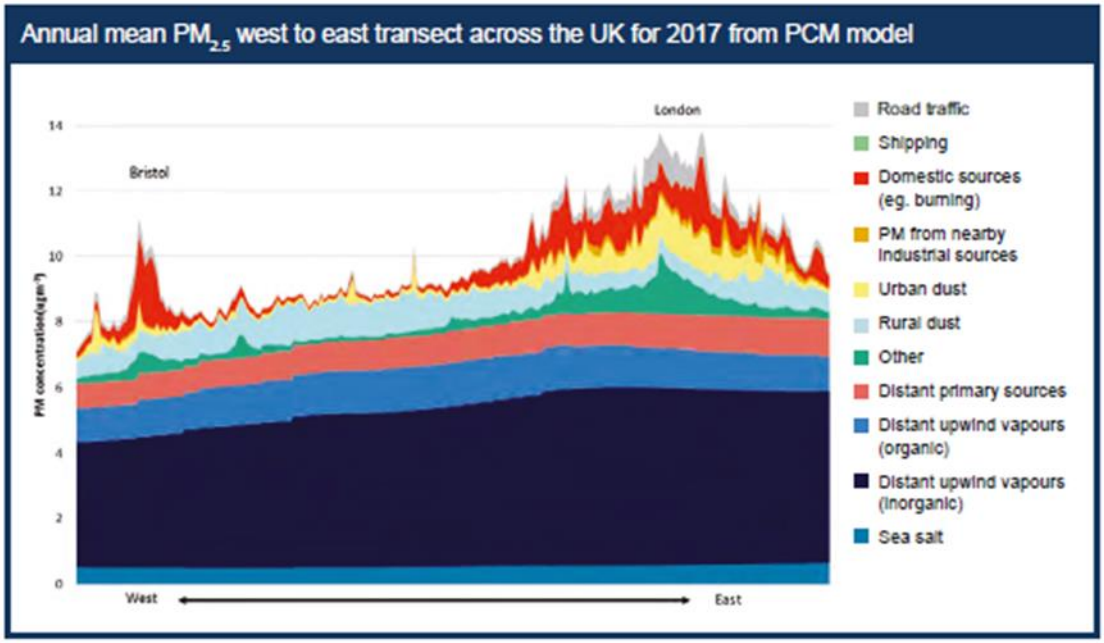
It should be noted that the UK Governments Air Quality Strategy (May 2019) details PM2.5 source contribution to annual mean concentrations across the UK, highlighting a number of cities that fall on the chosen transect line, including Nottingham. (Fig 4).

The PCM model indicates that as much as 80% of Nottingham's PM2.5 levels come from distant primary sources and distant upwind vapours e.g. industrial, commercial and agricultural sources outside the City's boundary and therefore any action by Nottingham City Council will only have a small impact on PM2.5 levels.

Figure 4: $PM_{2.5}$ distribution and source apportionment from Clean Air Strategy May 2019.

These images show how particulate matter from across the country can build up in the atmosphere as 'background pollution' and the role that this can play in combination with local sources in areas with a pollution challenge.







29

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

This section sets out the monitoring undertaken within 2020 by Nottingham City Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2016 and 2020 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Nottingham City Council undertook automatic (continuous) monitoring at three sites during 2020.

Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at https://uk-air.defra.gov.uk/data/data_selector

The https://nottinghamaqm.net/ page presents automatic monitoring results for Nottingham City Council, with automatic monitoring results also available through the UK-Air website https://uk-air.defra.gov.uk/interactive-map?network=nondefraaqmon

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

Nottingham City Council undertook non- automatic (i.e. passive) monitoring of NO_2 at 38 sites during 2020. Table A.2 in Appendix A presents the details of the non-automatic sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. annualisation and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias, annualisation (where the annual mean data capture is below 75% and greater than 33%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2020 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

2020's monitoring generally shows a larger reduction in the number of diffusion tube monitoring sites exceeding the annual mean air quality objective (when applying the local bias adjustment factor) down to 4 (from 18 in 2019), and a reduction in monitored NO2 concentrations at the 3 real time analyser sites. All RTA sites remained below the NO2 annual mean air quality objective of 40 ug/m3.

No changes are proposed to the diffusion tube network.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A: Monitoring Results compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past five years with the air quality objective of 40µg/m^3.

Table A.7 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past five years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

No exceedances of the Air Quality Objectives were recorded at either of the two AURN sites.

3.2.3 Particulate Matter ($PM_{2.5}$)

Table A.8 in Appendix A presents the ratified and adjusted monitored $PM_{2.5}$ annual mean concentrations for the past five years.

Computer dispersion modelling undertaken for DEFRA apportions approximately 80% of PM2.5 pollution to sources outside Nottingham City.

3.2.4 Sulphur Dioxide (SO_2)

Table A.9 in Appendix A compares the ratified continuous monitored SO_2 concentrations for 2020 with the air quality objectives for SO_2.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CG NOx	Carter Gate	Roadside	457945	339667	NO2 NO NOx	Y	Chemiluminescent	12	4	2.5
LS NOx	Lace Street	Roadside	454940	338314	NO2 NO NOx	Y	Chemiluminescent	3	9	1.5
SA NOx	St. Andrews Road	Roadside	456967	341382	NO2 NO NOx	Y	Chemiluminescent	12	13	1.7
CC AURN	Clinton St East.	Urban background	457437	340049	PM2.5,PM10 NO2, NO, NOx O3 SO2	N	FDMS, FDMS Chemiluminescent Ultra Violet Absorption (UVA) Ultra Violet Fluorescence (UVF)	N/A	35	3
WB AURN	Western Boulevard	Kerbside	454573	341643	PM10 NO2	NO	FDMS Chemiluminescent	15	1	2.5

Notes:

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable

Table A.2 – Details of Non-Automatic Monitoring Sites

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
2	564 Derby Road	Roadside	454520	338931	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	23.0	No	2.5
4	121 Beeston Rd	Roadside	454784	338146	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	10.0	No	2.5
5	87 Abbey Street	Roadside	455146	338511	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	5.0	No	2.5
6	4 Western Blvd	Roadside	454466	340111	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	17.0	No	2.5
12	Alfreton Road LP (Bentinck Rd - Sch)	Roadside	455774	340812	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	6.0	No	2.5
13	238 Ilkeston Road	Roadside	455439	340131	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
14	Ilkeston Road LP	Kerbside	455622	340142	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	4.0	No	2.5

Nottingham City Council

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
16	1-6 Castle Gardens	Roadside	455870	339133	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
17	215 Castle Boulevard	Roadside	455955	339129	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	5.0	No	2.5
19	87 Castle Blvd	Roadside	456853	339303	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	4.0	No	2.5
21	Salutation Inn Maid Marian Way	Roadside	457083	339637	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
24, 25, 26	St Andrew's Rd T	Roadside	456967	341382	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	12.0	16.0	Yes	1.5
27	21 Cartergate	Roadside	457963	339681	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	8.0	No	2.5
28	Riverbank PH Trent Bridge	Roadside	458060	338276	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	2.0	No	2.5
30	LP 53890 Manvers Street	Roadside	458079	339887	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5

Nottingham City Council

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
31	134 Middleton Boulevard	Roadside	454367	339946	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	17.0	No	2.5
33	Lace Street NOx RTA	Roadside	454941	338314	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	9.0	Yes	1.5
35	Lampost 70 Wollaton Road	Roadside	454587	340088	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	10.0	3.0	No	2.5
40	Lampost Middleton Boulevard/Crown Island	Roadside	454321	339931	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	15.0	5.0	No	2.5
43	328 Derby Road	Roadside	455453	339595	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	6.0	3.0	No	2.5
44	Parking Post Cliff Road	Roadside	457775	339530	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	4.0	17.0	No	2.5
46	Hicking Building Queens Road	Roadside	457781	339123	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
47	Carrington Road/Railway Station (Sheriffs Way)	Roadside	457406	339153	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	23.0	1.0	No	2.5

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
49	2 Castle Boulevard	Roadside	457150	339384	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	4.0	No	2.5
50	A52 Clifton Boulevard	Roadside	455713	337838	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
51	Trent Street	Roadside	457528	339339	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	2.0	No	2.5
52	Lamppost Crown Public House	Roadside	454386	340087	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
53	3 Bayard Court	Roadside	454243	340057	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
55	40 Horwood Drive	Roadside	456441	336131	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	4.0	2.0	No	2.5
56	Mountford House Nursery (Lampost outside)	Kerbside	457064	342128	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	10.0	1.0	No	2.5
57	Stepping Stones Retirement Park	Roadside	456265	336414	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	35.0	No	2.5

Nottingham City Council

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
10, 58, 59	565 Valley Road	Roadside	455528	342828	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	7.0	No	2.5
20, 60, 61	13 Canning Terrace	Roadside	456399	340191	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	5.0	No	2.5
22, 62, 63	Alfreton Road LP 80A01 in front of Beyts Takeaway	Roadside	456156	340383	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
29, 64, 65	346 Meadow Lane	Roadside	458459	339011	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
54, 66, 67	Trafford gardens play area	Roadside	454493	341505	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	3.0	No	2.5
68	Clifton Lane KL409	Roadside	455538	335731	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	0.0	4.0	No	2.5
69	Sturgeon Avenue 14S309	Roadside	455529	335701	NO2	AQMA No.2 (Nottingham City Council) 09/01/2019	5.0	10.0	No	2.5

Notes: (1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CG NOx	457945	339667	Roadside	100	99.6	**40**	**41**	35	35	23
LS NOx	454940	338314	Roadside	100	90.7	35	33	32	31	23
SA NOx	456967	341382	Roadside	100	99.6	39	**41**	34	**40**	34
AURN CC	457437	340049	Urban Background	100	99	31	30	28	28	19
AURN WB	454573	341643	Roadside	100	99	39	36	34	33	25

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16.**

☒ **Reported concentrations are those at the location of the monitoring site (annualised, as required), i.e. prior to any fall-off with distance correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
2	454520	338931	Roadside		100.0	27.4	31.6	26.7	29.5	27.2
4	454784	338146	Roadside		100.0	31.7	35.5	32.4	35.0	28.2
5	455146	338511	Roadside		100.0	33.4	35.6	30.1	31.5	32.9
6	454466	340111	Roadside		100.0	29.9	35.7	29.1	33.1	30.3
12	455774	340812	Roadside		84.6	37.6	**40.2**	32.7	34.9	37.9
13	455439	340131	Roadside		100.0	34.8	34.6	33.2	35.4	35.7
14	455622	340142	Kerbside		92.3	**46.9**	**49.8**	**45.9**	**46.4**	**43.0**
16	455870	339133	Roadside		100.0	36.7	**41.4**	36.3	**40.3**	34.9
17	455955	339129	Roadside		100.0	39.0	38.4	37.7	38.5	37.2
19	456853	339303	Roadside		100.0	32.7	34.3	32.0	33.2	28.2
21	457083	339637	Roadside		73.1	**43.4**	**46.4**	**42.9**	**43.5**	29.6
24, 25, 26	456967	341382	Roadside		100.0	35.6	**41.1**	35.5	38.0	35.2
27	457963	339681	Roadside		75.0	39.9	**47.5**	**40.0**	**42.3**	36.8

Nottingham City Council

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2020 (%) [2]	2016	2017	2018	2019	2020
28	458060	338276	Roadside		100.0	38.9	**40.6**	35.5	35.8	31.8
30	458079	339887	Roadside		100.0	**45.1**	**45.7**	**43.5**	**42.3**	**40.7**
31	454367	339946	Roadside		100.0	28.6	36.6	27.4	29.5	27.2
33	454941	338314	Roadside		92.3	34.1	37.8	33.7	36.3	32.3
35	454587	340088	Roadside		100.0	**42.4**	**42.2**	**42.2**	39.8	35.2
40	454321	339931	Roadside		100.0	23.2	35.7	36.9	35.8	29.3
43	455453	339595	Roadside		100.0	29.9	35.2	28.3	28.9	27.1
44	457775	339530	Roadside		100.0	26.3	**41.1**	38.6	39.5	32.6
46	457781	339123	Roadside		100.0	**45.5**	**52.7**	**48.3**	**52.9**	**47.8**
47	457406	339153	Roadside		92.3	**45.3**	**47.4**	38.9	**48.9**	39.3
49	457150	339384	Roadside		100.0	**50.6**	**52.7**	**45.9**	38.0	37.7
50	455713	337838	Roadside		92.3		**59.0**	**50.9**	**54.9**	**42.1**
51	457528	339339	Roadside		100.0		**49.1**	37.6	37.0	30.9
52	454386	340087	Roadside		92.3				**40.8**	34.5

Nottingham City Council

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2020 (%) [2]	2016	2017	2018	2019	2020
53	454243	340057	Roadside		92.3				34.3	27.2
55	456441	336131	Roadside		84.6				31.3	22.6
56	457064	342128	Kerbside		25.0				**52.3**	**41.4**
57	456265	336414	Roadside		100.0				27.5	22.7
10, 58, 59	455528	342828	Roadside		100.0	38.0	**41.2**	39.4	**40.1**	38.2
20, 60, 61	456399	340191	Roadside		100.0	**49.3**	**48.8**	**49.6**	**49.0**	39.6
22, 62, 63	456156	340383	Roadside		100.0	**46.5**	**47.8**	**43.7**	**40.5**	31.3
29, 64, 65	458459	339011	Roadside		100.0	**45.0**	**46.1**	**44.6**	**45.2**	**41.9**
54, 66, 67	454493	341505	Roadside		100.0				**42.7**	36.1
68	455538	335731	Roadside		100.0					33.7
69	455529	335701	Roadside		90.4					29.4

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16.**

☒ **Diffusion tube data has been bias adjusted.**

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

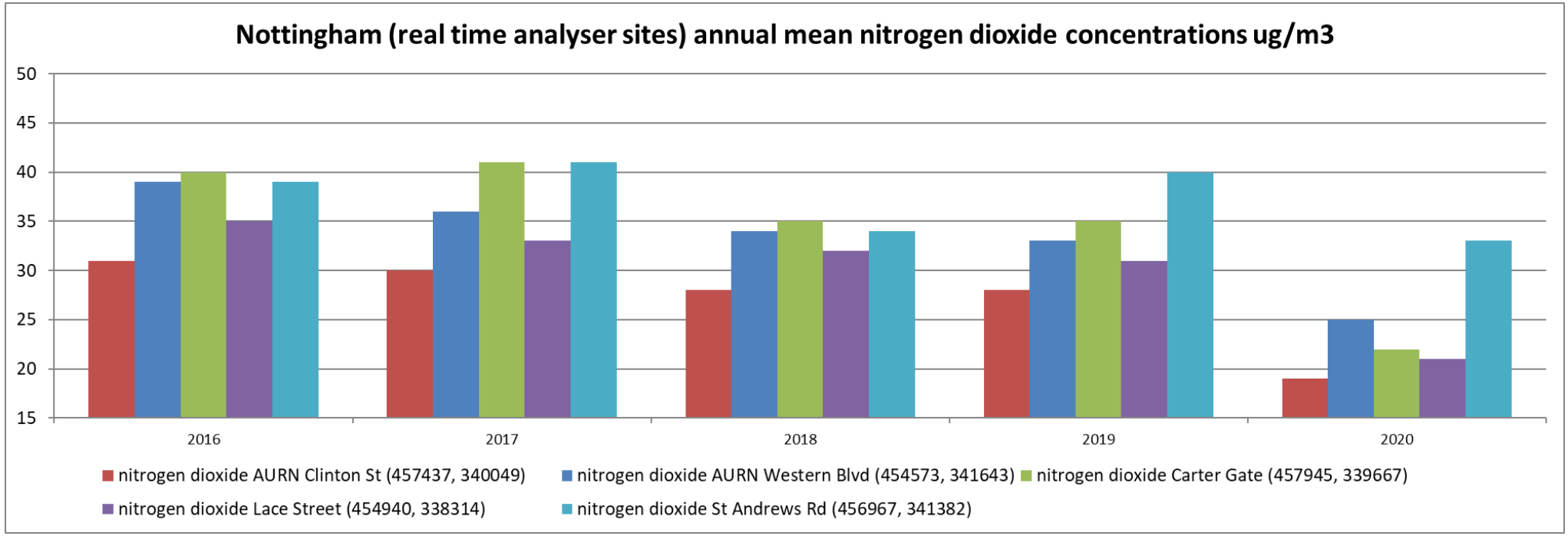


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CG NO2	457945	339667	Roadside	99.6	99.6	0	0	0	0	0
LS NO2	454940	338314	Roadside	90.7	90.7	0	0	0	0	0
SA NO2	456967	341382	Roadside	99.6	99.6	0	2	0	0	0
CC AURN	457437	340049	Urban Background	99	99	0	0	0	0	0
WB AURN	454573	341643	Roadside	99	99	0	0	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.6 – Annual Mean PM_{10} Monitoring Results ($\mu g/m^3$)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CC AURN	457437	340049	Urban Background	99	99	17	18	16	18	15
WB AURN	454573	341643	Roadside	98	98	20	18	18	20	16

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16.**

Notes:

The annual mean concentrations are presented as $\mu g/m^3$.

Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ are shown in **bold**.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations

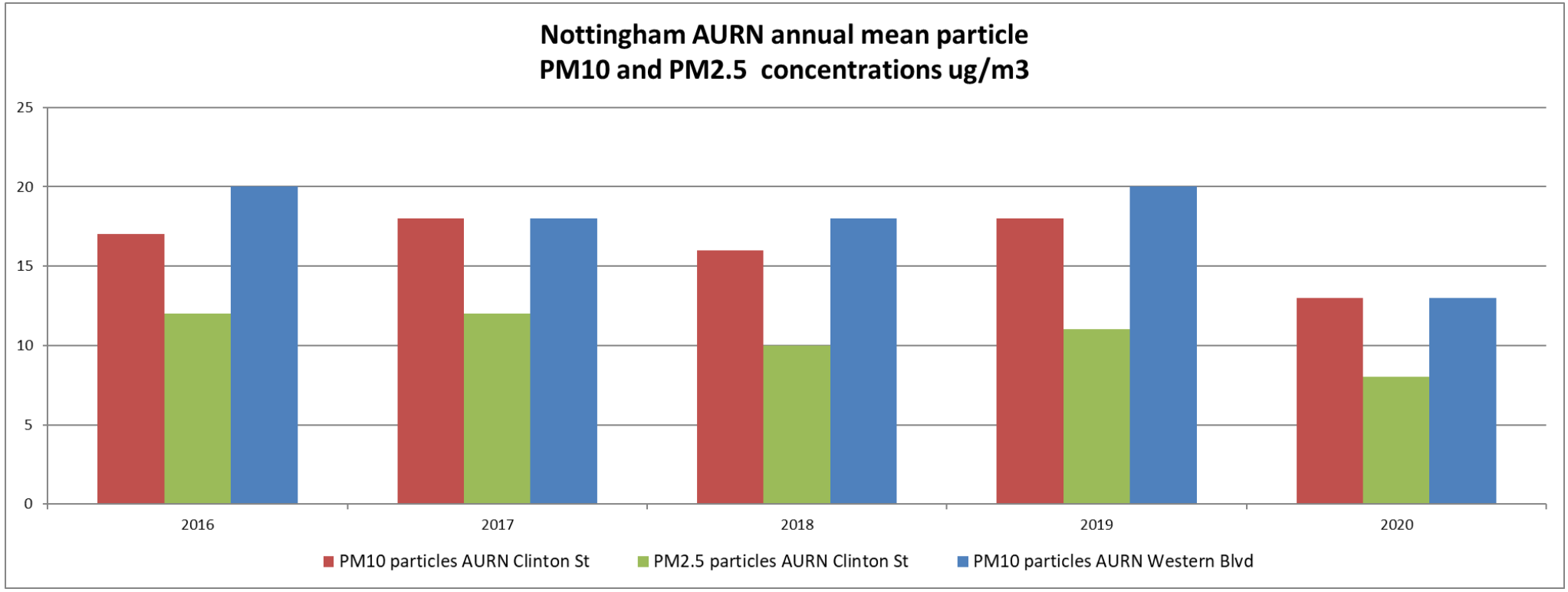


Table A.7 – 24-Hour Mean PM_{10} Monitoring Results, Number of PM_{10} 24-Hour Means > 50µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CC AURN	457437	340049	Urban Background	99	99	4	5	2	9	0
WB AURN	454573	341643	Roadside	98	98	5	8	2	12	3

Notes:

Results are presented as the number of 24-hour periods where daily mean concentrations greater than 50µg/m^3 have been recorded.

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table A.8 – Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	2016	2017	2018	2019	2020
CC AURN	457437	340049	Urban Background	99	99	12	12	10	11	9

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16.**

Notes:

The annual mean concentrations are presented as µg/m^3.

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Figure A.3 – Trends in Annual Mean $PM_{2.5}$ Concentrations

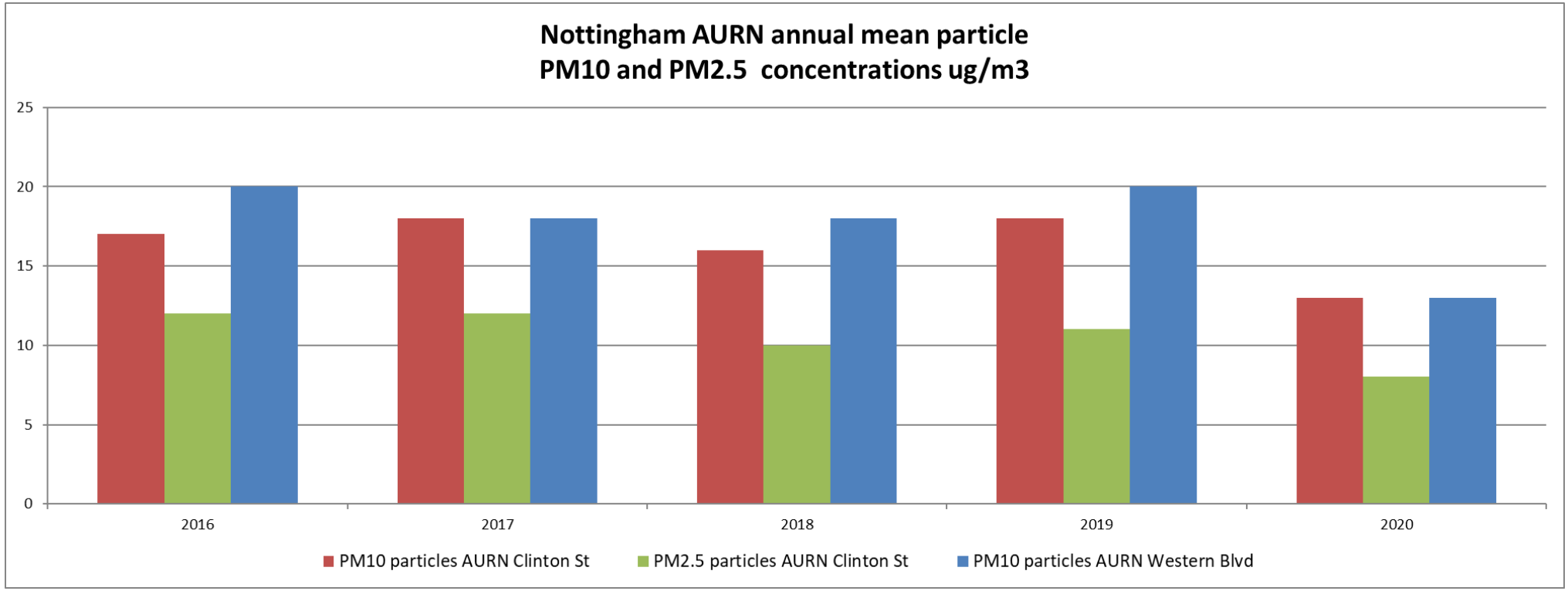


Table A.9 – SO_2 2020 Monitoring Results, Number of Relevant Instances

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2020 (%) (2)	Number of 15-minute Means > 266µg/m^3	Number of 1-hour Means > 350µg/m^3	Number of 24-hour Means > 125µg/m^3
CC AURN	457437	340049	Urban Background	57	57	0	0	0

Notes:

Results are presented as the number of instances where monitored concentrations are greater than the objective concentration.

Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year).

If the period of valid data is less than 85%, the relevant percentiles are provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Appendix B: Full Monthly Diffusion Tube Results for 2020

Table B.1 – NO_2 2020 Diffusion Tube Results ($\mu g/m^3$)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (1.10)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
2	454520	338931	37.0	30.3	25.3	15.0	25.3	12.7	15.6	18.8	23.9	26.6	36.4	29.6	24.7	27.2	-	
4	454784	338146	36.0	28.5	28.0	17.0	28.0	15.6	17.6	20.6	25.0	27.0	33.9	30.0	25.6	28.2	-	
5	455146	338511	41.5	35.6	32.7	19.4	32.7	18.9	19.9	22.4	30.5	29.4	43.5	32.3	29.9	32.9	-	
6	454466	340111	36.9	33.6	27.7	15.9	27.7	17.8	22.8	21.4	29.2	29.7	37.5	30.4	27.5	30.3	-	
10	455528	342828	41.7	38.6	37.1	29.7	37.1	28.2	28.7	31.8	38.0	38.7	40.6	37.8	-	-	-	Triplicate Site with 10, 58 and 59 - Annual data provided for 59 only
12	455774	340812		29.6	27.9		27.9	19.2	22.0	80.1	33.3	31.1	38.5	35.1	34.5	37.9	-	
13	455439	340131	32.9	28.7	30.0	22.7	30.0	22.1	17.8	26.6	46.1	43.0	45.5	44.1	32.5	35.7	-	
14	455622	340142	46.2	41.2	37.6	27.1	37.6	32.6	33.2	38.5		48.4	48.7	38.5	39.1	**43.0**	-	
16	455870	339133	46.4	41.7	33.6	20.7	33.6	21.4	22.5	24.6	30.0	31.4	41.4	33.9	31.8	34.9	-	
17	455955	339129	43.9	41.5	29.7	21.1	29.7	22.2	44.7	27.2	33.7	35.4	40.9	35.8	33.8	37.2	-	
19	456853	339303	38.3	35.0	29.0	18.6	29.0	16.6	15.7	18.1	21.2	23.8	32.8	29.3	25.6	28.2	-	
20	456399	340191	44.9	40.9	37.9	26.6	37.9	26.6	28.4	35.8	41.2		45.1	39.9	-	-	-	Triplicate Site with 20, 60 and 61 - Annual data provided for 61 only
21	457083	339637	39.9	37.0	8.9	20.4	8.9	20.3	31.4				40.6	34.7	26.9	29.6	-	
22	456156	340383	34.1	28.7	30.6	21.4	30.6	21.4	19.7	30.6	31.2	32.4	36.6	21.5	-	-	-	Triplicate Site with 22, 62 and 63 - Annual data provided for 63 only
24	456967	341382	44.5	44.7	28.0	15.9	28.0	19.5	29.2	28.5	33.4	36.0	35.3	28.8	-	-	-	Triplicate Site with 24, 25 and 26 - Annual data provided for 26 only
25	456967	341382	43.7		29.4	16.9	29.4	19.3	28.8	25.6	30.4	36.6	44.3	36.0	-	-	-	Triplicate Site with 24, 25 and 26 - Annual data provided for 26 only
26	456967	341382	49.1	40.3	32.8	16.4	32.8	18.6	28.6	28.0	34.6	35.5	40.9	38.6	32.0	35.2	-	Triplicate Site with 24, 25 and 26 - Annual data provided for 26 only
27	457963	339681	47.3	42.4	35.3	22.8	35.3	22.5	25.5			34.8		35.2	33.5	36.8	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (1.10)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
28	458060	338276	36.5	33.7	30.8	17.5	30.8	20.5	23.0	26.1	30.8	28.4	33.9	34.4	28.9	31.8	-	
29	458459	339011	43.5	37.4	38.6	29.0	38.6	32.3	27.4		45.0	44.1	49.9	45.5	-	-	-	Triplicate Site with 29, 64 and 65 - Annual data provided for 65 only
30	458079	339887	46.3	40.3	38.1	27.1	38.1	26.2	29.2	34.6	39.9	41.8	40.8	41.1	37.0	**40.7**	-	
31	454367	339946	33.8	28.0	23.7	16.0	23.7	15.9	19.6	20.6	25.3	27.2	32.3	30.3	24.7	27.2	-	
33	454941	338314	40.9	31.8	30.9	18.8	30.9		17.2	21.8	30.5	27.9	38.8	33.6	29.4	32.3	-	
35	454587	340088	45.2	39.3	33.0	20.9	33.0	21.1	26.4	26.0	33.5	31.9	41.0	33.4	32.0	35.2	-	
40	454321	339931	31.1	26.0	16.2	23.1	31.0	24.2	17.9	26.3	26.5	28.1	32.4	37.1	26.7	29.3	-	
43	455453	339595	34.1	27.6	13.6	17.7	26.1	15.6	16.3	20.2	25.4	28.6	39.3	30.8	24.6	27.1	-	
44	457775	339530	44.7	38.8	17.1	21.6	32.7	19.9	21.9	24.1	30.5	30.9	37.6	35.9	29.6	32.6	-	
46	457781	339123	58.0	46.8	21.6	26.9	41.3	28.4	31.1	42.6	53.1	54.5	63.7	53.9	43.5	**47.8**	-	
47	457406	339153	48.9		20.9	28.3	40.1	26.7	25.5	31.5	43.2	42.8	44.5	40.2	35.7	39.3	26.3	
49	457150	339384	46.7	46.8	17.5	24.0	33.5	26.5	24.6	29.2	39.0	36.9	46.2	40.8	34.3	37.7	-	
50	455713	337838	54.3	47.5	20.9	25.4	40.1	27.3	33.5	35.7		40.2	50.9	45.0	38.3	**42.1**	-	
51	457528	339339	48.2	37.8	15.5	17.5	29.7	14.9	18.8	22.3	27.2	29.8	40.5	34.7	28.1	30.9	-	
52	454386	340087		38.5	17.3	23.4	33.1	25.0	25.8	30.3	33.3	35.2	42.1	40.9	31.3	34.5	-	
53	454243	340057	35.0	28.7	16.1		30.9	16.0	15.1	20.1	22.5	25.8	31.0	31.3	24.8	27.2	-	
54	454493	341505	47.4	38.9	16.1	20.7	30.8	23.1	28.7	27.9	33.1		42.5	39.5	-	-	-	Triplicate Site with 54, 66 and 67 - Annual data provided for 67 only
55	456441	336131			11.1	12.0	21.3	11.6	16.7	17.5	23.0	24.9	34.9	32.4	20.5	22.6	-	
56	457064	342128						19.4	29.9			42.5			30.6	**41.4**	30.6	
57	456265	336414	28.6	20.9	12.2	15.4	23.3	15.0	13.8	19.8	22.5	23.3	27.1	25.3	20.6	22.7	-	
58	455528	342828	36.7	36.7	19.4	30.2	37.1	28.3	28.9	33.8	39.5	38.3	38.5	42.4	-	-	-	Triplicate Site with 10, 58 and 59 - Annual data provided for 59 only

Nottingham City Council

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (1.10)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
59	455528	342828	43.0	36.1	19.3	27.6	37.0	30.2	30.0	33.6	34.8	36.7	43.8	38.8	34.7	38.2	-	Triplicate Site with 10, 58 and 59 - Annual data provided for 59 only
60	456399	340191	50.0	41.6	20.9	26.5	40.0	26.6	30.6	37.1	39.0	37.2	43.3	39.5	-	-	-	Triplicate Site with 20, 60 and 61 - Annual data provided for 61 only
61	456399	340191		41.7	19.8	26.2	37.9	28.7	28.8	36.8	37.0		40.7	39.6	36.0	39.6	-	Triplicate Site with 20, 60 and 61 - Annual data provided for 61 only
62	456156	340383	38.3	27.5	17.1	21.3	32.8	22.1	23.7	29.3	29.8	34.8	36.7	40.6	-	-	-	Triplicate Site with 22, 62 and 63 - Annual data provided for 63 only
63	456156	340383	34.5	27.0	16.4	21.0	31.5	21.6	20.8	27.7	29.4	29.2	37.5	33.6	28.4	31.3	-	Triplicate Site with 22, 62 and 63 - Annual data provided for 63 only
64	458459	339011	48.2	41.2	20.9	30.7	40.0	32.0	30.5	36.0	40.4	38.2	49.8	39.7	-	-	-	Triplicate Site with 29, 64 and 65 - Annual data provided for 65 only
65	458459	339011	48.9	41.2	21.9	31.5	42.0	32.7	28.5		41.6	41.5	49.0	42.7	38.1	**41.9**	-	Triplicate Site with 29, 64 and 65 - Annual data provided for 65 only
66	454493	341505	50.3	44.3	18.7	20.7	35.9	22.5	26.6	30.8	34.0	38.5	43.2	39.4	-	-	-	Triplicate Site with 54, 66 and 67 - Annual data provided for 67 only
67	454493	341505	48.5	42.0	17.3	19.9	33.1	21.4	29.1	27.9	32.6	33.9	41.9	42.9	32.8	36.1	-	Triplicate Site with 54, 66 and 67 - Annual data provided for 67 only
68	455538	335731	42.8	36.1	16.7	20.5	32.1	20.7	28.4	28.1	34.8	34.9	37.3	35.5	30.6	33.7	-	
69	455529	335701	40.3	32.1	15.7	17.6	30.0	18.0	25.6	22.5	27.1		33.5	31.5	26.7	29.4	-	

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**

☒ **Annualisation has been conducted where data capture is <75% and >33% in line with LAQM.TG16.**

☒ **Local bias adjustment factor used.**

☐ **National bias adjustment factor used.**

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column.**

☒ **Nottingham City Council confirm that all 2020 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

See Appendix C for details on bias adjustment and annualisation.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

New or Changed Sources Identified Within Nottingham City Council During 2020

Nottingham City Council has not identified any new major or significant sources relating to air quality within the reporting year of 2020.

Changes continue to be made the City Centre road layout and prioritisation under the Southside Transport (Broadmarsh) project (Table 2.2 NCC07)

Additional Air Quality Works Undertaken by Nottingham City Council During 2020

Nottingham City Council has not completed any additional works within the reporting year of 2020.

QA/QC of Diffusion Tube Monitoring

Gradko International supply and analyse Nottingham City Council's diffusion tubes. The organisation is UKAS accredited and is assessed annually for compliance to ISO 17025 and participates in other proficiency schemes.

Gradko have confirmed that their procedures follow the guidance issued on behalf of Defra (AEA Energy & Environment, Feb 2008) relating to the preparation, extraction, analysis and calculation procedures for passive NO_2 diffusion tubes

Gradko participate in a number of QA/QC monitoring systems to demonstrate satisfactory performance including the Workplace Analysis Scheme for Proficiency (WASP) programme to ensure uniformity in data throughout the year.

Precision vs Accuracy (Bias)

A further aspect of QA/QC for a laboratory is the reproducibility of results i.e. precision. Precision should not be confused with accuracy. Diffusion tube precision can be described

as the ability of a measurement to be consistently reproduced, i.e. how similar the results of duplicate or triplicate tubes are to each other.

Accuracy represents the ability of the measurement to represent the 'true' value, which for the monitoring results, is defined as the results from the automatic analysers. When averaged over a number of sets of results bias can be evident. This represents the overall tendency of the diffusion tubes to depart from the 'true' value, i.e. to systematically over-or under-read when compared against the reference method.

Once identified, bias can be adjusted for to improve the accuracy of diffusion tube results. This is done using bias adjustment factors which have been found to be specific to a laboratory and tube preparation method. See Appendix A subsection A-1 above.

Unlike bias, poor precision cannot be adjusted for. It can only be improved by careful handling of the tubes in both the laboratory and the field.

The LAQM website provides a link to the summary of precision results for individual laboratories - **Summary of Diffusion Tube Precision 2008-2020 (updated March 2021)**. It can be downloaded as a PDF from http://laqm.defra.gov.uk/diffusion-tubes/precision.html.

The 2020 precision rating for Gradko supplied/analyzed diffusion tubes was 'good'. This precision reflects the laboratory's performance/consistency in preparing and analyzing the tubes, as well as the subsequent handling of the tubes in the field.

Nottingham City Council's collocation study data contributes to the rating. The data spreadsheet also allows NCC to determine whether its collocation study's bias adjustment factor should be used in preference to the national bias adjustment factor derived from collocation studies conducted by other local authorities.

Nottingham City Council's 2020 collocation study results:-

Nottingham City Council

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation	95% CI of mean
1	09/01/2020	04/02/2020	44.52	43.75	43.09	46	2.9	6	7.2
2	04/02/2020	03/03/2020	44.67		40.28	42	3.1	7	27.9
3	03/03/2020	01/04/2020	27.38	29.42	32.77	30	2.5	8	6.1
4	01/04/2020	04/05/2020	15.9	16.33	16.44	16	0.5	3	1.3
5	04/05/2020	03/06/2020	19.5	19.31	18.58	19	0.5	3	1.2
6	03/06/2020	01/07/2020	19.33	19.68	19.39	20	0.3	2	0.8
7	01/07/2020	29/07/2020	29.21	28.78	28.62	29	0.3	1	0.8
8	29/07/2020	02/09/2020	28.5	25.57	27.39	27	1.6	6	3.9
9	02/09/2020	29/09/2020	33.39	30.4	34.58	33	2.2	7	5.3
10	29/09/2020	05/11/2020	36.04	36.55	35.53	36	0.5	1	1.3
11	05/11/2020	02/12/2020	35.33	44.27	40.34	40	4.5	11	11.2
12	02/12/2020	05/01/2021	28.76	35.97	38.63	34	5.1	15	12.7
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
51	99.6	Good	Good
40.3	99.6	Good	Good
39.7	99.9	Good	Good
31.6	99.7	Good	Good
30.2	99.9	Good	Good
19.8	96	Good	Good
24.1	99.7	Good	Good
25.2	99.7	Good	Good
31.7	99.8	Good	Good
33.2	99.8	Good	Good
44.2	99.9	Good	Good
37	99.2	Good	Good
Overall survey -->		Good precision	Good Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Nottingham St Andrews Road

Precision 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

Bias calculated using 12 periods of data

Bias factor A 1.09 (0.96 - 1.27)

Bias B -9% (-21% - 4%)

Diffusion Tubes Mean: 31 µgm^{-3}

Mean CV (Precision): 6

Automatic Mean: 34 µgm^{-3}

Data Capture for periods used: 99%

Adjusted Tubes Mean: 34 (30 - 39) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 12 periods of data

Bias factor A 1.09 (0.96 - 1.27)

Bias B -9% (-21% - 4%)

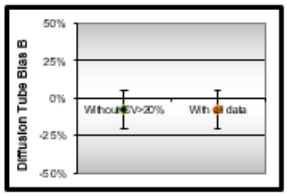
Diffusion Tubes Mean: 31 µgm^{-3}

Mean CV (Precision): 6

Automatic Mean: 34 µgm^{-3}

Data Capture for periods used: 99%

Adjusted Tubes Mean: 34 (30 - 39) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

National Diffusion Tube Bias Adjustment Factor Spreadsheet

Spreadsheet Version Number: 03/21

Follow the steps below in the correct order to show the results of relevant co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2021
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List

If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List

If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List

If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@bureauveritas.com or 0800 0327953

Analysed By[1]	Method	Year[5]	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m^3)	Automatic Monitor Mean Conc. (Cm) (µg/m^3)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2020	R	Gedling Borough Council	10	31	25	24.1%	G	**0.81**
Gradko	20% TEA in water	2020	R	SOUTHAMPTON CITY COUNCIL	12	37	27	37.1%	G	**0.73**
Gradko	20% TEA in water	2020	R	Fareham Borough Council	10	25	14	77.4%	G	**0.56**
Gradko	20% TEA in water	2020	R	Fareham Borough Council	12	30	22	35.1%	G	**0.74**
Gradko	20% TEA in water	2020	R	Fareham Borough Council	10	22	17	26.5%	G	**0.79**
Gradko	20% TEA in water	2020	R	SOUTHAMPTON CITY COUNCIL	11	32	31	4.3%	G	**0.95**
Gradko	20% TEA in water	2020	KS	Marylebone Road Intercomparison	12	57	43	33.3%	G	**0.75**
Gradko	20% TEA in water	2020	R	Bath & North East Somerset	11	32	29	13.0%	G	**0.89**
Gradko	20% TEA in water	2020	R	Gateshead Council	12	22	17	28.1%	G	**0.78**
Gradko	20% TEA in water	2020	R	Gateshead Council	12	23	21	11.6%	G	**0.90**
Gradko	20% TEA in water	2020	R	Gateshead Council	10	26	25	6.5%	G	**0.94**
Gradko	20% TEA in water	2020	R	Gateshead Council	12	28	21	30.5%	G	**0.77**
Gradko	20% TEA in water	2020	R	Gateshead Council	12	31	32	-3.4%	G	**1.03**
Gradko	20% TEA in water	2020	R	Luton Borough Council	9	38	28	33.8%	G	**0.75**
Gradko	20% TEA in water	2020	R	Nottingham City Council	12	31	34	-8.5%	G	**1.09**
Gradko	20% TEA in water	2020	R	Dudley MBC	13	33	28	19.9%	G	**0.83**
Gradko	20% TEA in water	2020	UB	Dudley MBC	13	23	14	61.2%	G	**0.62**
Gradko	20% TEA in water	2020	R	Dudley MBC	13	44	34	30.6%	G	**0.77**
Gradko	20% TEA in water	2020		**Overall Factor[3] (18 studies)**				**Use**		**0.81**

Diffusion Tube Annualisation

Annualisation was required for one site and calculated within the DTDP tool.

Diffusion Tube ID	Annualisation Factor AURN Clinton St	Annualisation Factor NCC Lace St	Annualisation Factor Site 3 Name	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Simple Annual Mean (µg/m3)	Annualised Data Simple Annual Mean (µg/m3)
56	1.2402	1.2204			1.2303	30.6	37.6

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2020 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

Nottingham City Council have applied a local bias adjustment factor of 1.10 (taken from the DTPT) to the 2020 monitoring data. A summary of bias adjustment factors used by Nottingham City Council over the past five years is presented in Table C.1.

A local bias adjustment factor has been used because 3 tubes are collocated with a real time analyser that is serviced, routinely calibrated, independently data-scaled/validated, has a high data collection rate.

Table C.1 – Bias Adjustment Factor

Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2020	Local	03/21	1.10
2019	Local	09/20	1.08
2018	Local	06/19	1.00
2017	Local	09/18	1.07
2016	National	06/17	0.97

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with distance calculator available on the LAQM Support

website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

Fall off with distance calculations were performed by the DTDP tool for two sites and reported below:-

Diffusion Tube ID	Distance (m)		NO_2 Annual Mean Concentration (µg/m³)		
	Monitoring Site to Kerb	Receptor to Kerb	Bias Adjusted and Annualised	Background	Predicted at Receptor
47	1.0	24.0	39.2	19.0	26.3
56	1.0	11.0	41.4	19.0	30.6

QA/QC of Automatic Monitoring

AURN Site

The analysers at the AURN site are subject to a four weekly calibration regime. The calibrations are undertaken by a trained local site operator (LSO) and conducted in accordance with the Local Site Operators' Manual.

CG NOx, LS NOx and SA NOx Sites

At Nottingham City Council's CG NOx, LS NOx and SA NOx sites calibrations are carried out fortnightly. The calibrations, using zero air and span gases, are undertaken by the LSOs that prior to 2016 were also the LSOs for the City Centre AURN site. Calibrations are conducted using the same principles and procedures as given in the AURN LSO Manual.

The equipment is fully serviced every six months by Matts Monitors Ltd, Stroud.

Calibration Gas Traceability

AURN Site

Please visit the DEFRA site https://uk-air.defra.gov.uk/networks/ for more information.

CG NOx, LS NOx and SA NOx Sites

Calibration gases used in the CG NOx, LS NOx and SA NOx monitoring sites are supplied by Matts Monitors Ltd. The gases are supplied with a certificate of analysis.

Data Collection and Processing

AURN Site

Please visit https://uk-air.defra.gov.uk/data/ for more information.

CG NOx, LS NOx and SA NOx Sites

During 2020 data collection, validation and ratification was carried out by Air Quality Data Management Ltd http://www.aqdm.co.uk/

Automatic Monitoring Annualisation

All automatic monitoring locations within Nottingham City Council recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data. In addition, any sites with a data capture below 33% do not require annualisation.

NO_2 Fall-off with Distance from the Road

Wherever possible, local authorities should ensure that monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure should be estimated using the NO_2 fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

No automatic NO_2 monitoring locations within Nottingham City Council required distance correction during 2020.

Table C.2 – Annualisation Summary (concentrations presented in µg/m^3)

Site ID	Annualisation Factor AURN Clinton St	Annualisation Factor NCC Lace St	Annualisation Factor Site 3 Name	Annualisation Factor Site 4 Name	Average Annualisation Factor	Raw Data Annual Mean	Annualised Annual Mean	Comments
56	1.2402	1.2204			1.2303	30.6	37.6	

Table C.3 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2	Local Bias Adjustment Input 3	Local Bias Adjustment Input 4	Local Bias Adjustment Input 5
Periods used to calculate bias	12				
Bias Factor A	1.10 (1.97 – 1.28)				
Bias Factor B	-9% (-22% - 3%)				
Diffusion Tube Mean (µg/m^3)	31.1				
Mean CV (Precision)	5.8%				
Automatic Mean (µg/m^3)	34.3				
Data Capture	98%				
Adjusted Tube Mean (µg/m^3)	34 (30 – 40)				

Notes:

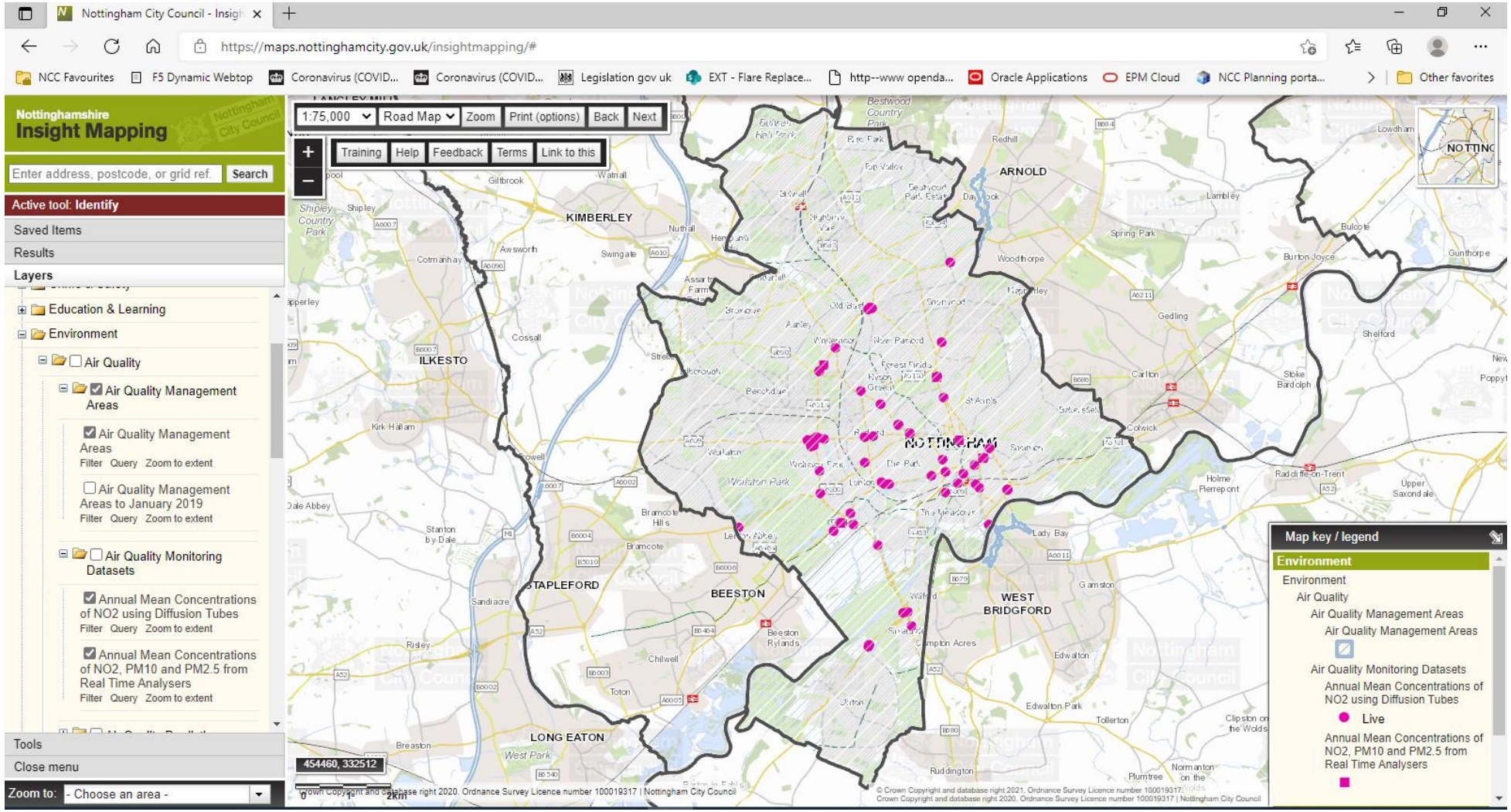
A single local bias adjustment factor has been used to bias adjust the 2020 diffusion tube results.

Table C.4 – NO_2 Fall off With Distance Calculations (concentrations presented in µg/m^3)

Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted	Background Concentration	Concentration Predicted at Receptor	Comments
47	1.0	24.0	39.2	19.0	26.3	*Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.*
56	1.0	11.0	41.4	19.0	30.6	

Appendix D: Map(s) of Monitoring Locations and AQMAs

Figure D.1 – Map of Monitoring Sites



Nottingham City Council

To view Nottingham City Council's monitoring site locations:-

1. Using Google Chrome or Microsoft Edge web browser navigate to:- https://maps.nottinghamcity.gov.uk/insightmapping/#
2. On the left hand menu column select 'Layers',
3. Select the '+' of the 'Environment' folder
4. Select the '+' of the Air Quality Management Areas
    a. Tick the box to show the location information of interest on the map
5. Select the '+' of the Air Quality Monitoring Datasets
    a. Tick the box to show the location information of interest on the map
6. Use the + button the map to zoom in (- to zoom out) if sites cannot be distinguished
7. Hover the mouse over the monitoring location of interest and press left mouse button to open the 'Results' table of information and monitoring data for the location.

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England7

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO_2)	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM_{10})	40µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO_2)	125µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO_2)	266µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

7 The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Appendix F: Impact of COVID-19 upon LAQM

COVID-19 has had a significant impact on society. Inevitably, COVID-19 has also had an impact on the environment, with implications to air quality at local, regional and national scales.

COVID-19 has presented various challenges for Local Authorities with respect to undertaking their statutory LAQM duties in the 2021 reporting year. Recognising this, Defra provided various advice updates throughout 2020 to English authorities, particularly concerning the potential disruption to air quality monitoring programmes, implementation of Air Quality Action Plans (AQAPs) and LAQM statutory reporting requirements. Defra has also issued supplementary guidance for LAQM reporting in 2021 to assist local authorities in preparing their 2021 ASR. Where applicable, this advice has been followed.

Despite the challenges that the pandemic has given rise to, the events of 2020 have also provided Local Authorities with an opportunity to quantify the air quality impacts associated with wide-scale and extreme intervention, most notably in relation to emissions of air pollutants arising from road traffic. The vast majority (>95%) of AQMAs declared within the UK are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely. On 23rd March 2020, the UK Government released official guidance advising all members of public to stay at home, with work-related travel only permitted when absolutely necessary. During this initial national lockdown (and to a lesser extent other national and regional lockdowns that followed), marked reductions in vehicle traffic were observed; Department for Transport (DfT) data8 suggests reductions in vehicle traffic of up to 70% were experienced across the UK by mid-April, relative to pre COVID-19 levels.

This reduction in travel in turn gave rise to a change of air pollutant emissions associated with road traffic, i.e. nitrous oxides (NO_x), and exhaust and non-exhaust particulates (PM). The Air Quality Expert Group (AQEG)[9] has estimated that during the initial lockdown period in 2020, within urbanised areas of the UK reductions in NO_2 annual mean concentrations were between 20 and 30% relative to pre-pandemic levels, which

8 Prime Minister's Office, COVID-19 briefing on the 31st of May 2020

9 Air Quality Expert Group, Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK, June 2020

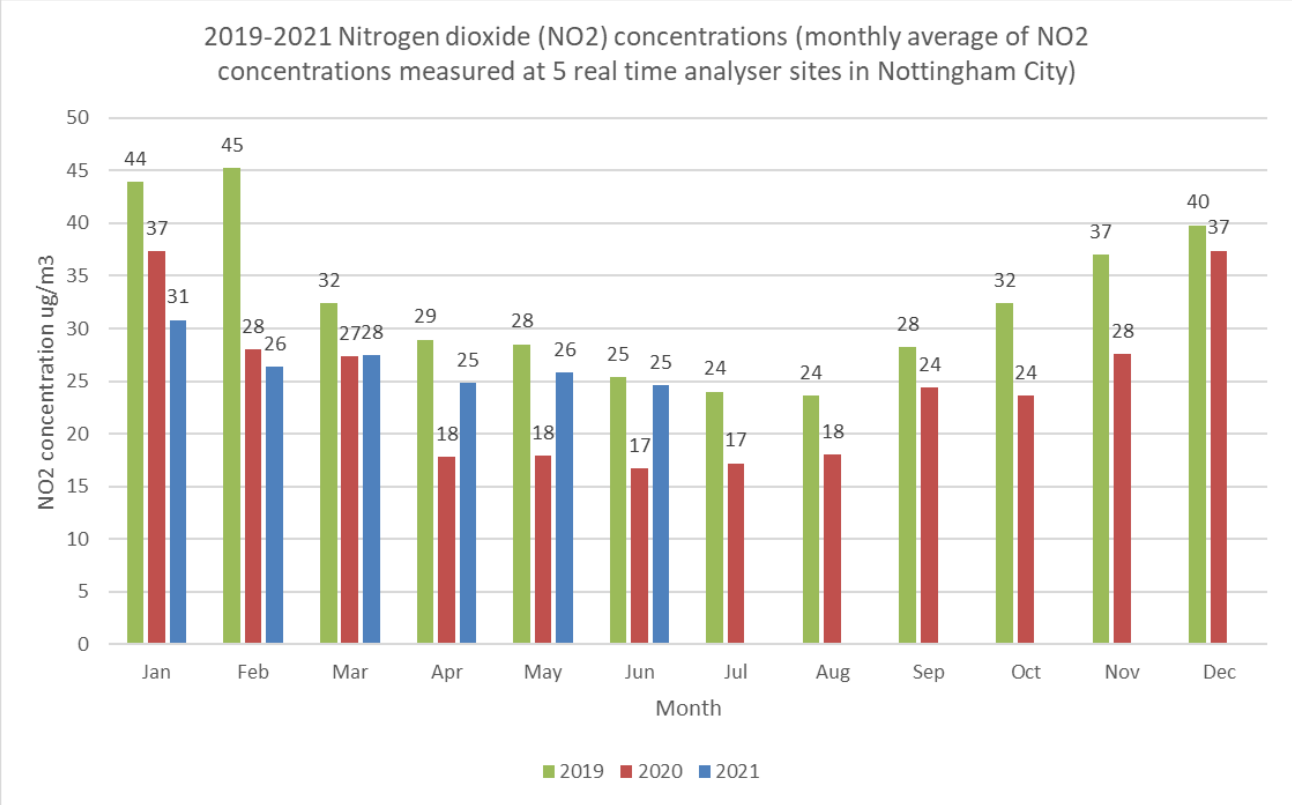
represents an absolute reduction of between 10 to 20µg/m^3 if expressed relative to annual mean averages. During this period, changes in $PM_{2.5}$ concentrations were less marked than those of NO_2. $PM_{2.5}$ concentrations are affected by both local sources and the transport of pollution from wider regions, often from well beyond the UK. Through analysis of AURN monitoring data for 2018-2020, AQEG have detailed that $PM_{2.5}$ concentrations during the initial lockdown period are of the order 2 to 5µg/m^3 lower relative to those that would be expected under business-as-usual conditions.

As restrictions are gradually lifted, the challenge is to understand how these air quality improvements can benefit the long-term health of the population.

Impacts of COVID-19 on Air Quality within City of Nottingham area

Compared with 2019 reductions of NO2 concentrations were experienced at all monitoring sites between April and June 2020.

Fig 2.



Nottingham City Council

Opportunities Presented by COVID-19 upon LAQM within City of Nottingham area

It appears that no LAQM related opportunities have arisen as a consequence of COVID-19 within the City of Nottingham. However this is to be reviewed in further detail.

Challenges and Constraints Imposed by COVID-19 upon LAQM within City of Nottingham's area

The main challenges that are believed to have arisen is the reduction in use of public transport and car club/ride sharing and the predictable increase in the use of private motor cars due to Covid-19 measures, particularly encouraging people to work from home as much as possible.

Once Covid-19 restrictions are lifted the challenge will be to encourage people back to using public transport etc., in preference to their own cars.

Table F 1 – Impact Matrix

Category	Impact Rating: None	Impact Rating: Small	Impact Rating: Medium	Impact Rating: High
Automatic Monitoring – Data Capture (%)	More than 75% data capture	~~50 to 75% data capture~~	~~25 to 50% data capture~~	~~Less than 25% data capture~~
Automatic Monitoring – QA/QC Regime	Adherence to requirements as defined in LAQM.TG16	~~Routine calibrations taken place frequently but not to normal regime. Audits undertaken alongside service and maintenance programmes~~	~~Routine calibrations taken place infrequently and service and maintenance regimes adhered to. No audit achieved~~	~~Routine calibrations not undertaken within extended period (e.g. 3 to 4 months). Interruption to service and maintenance regime and no audit achieved~~
Passive Monitoring – Data Capture (%)	More than 75% data capture	~~50 to 75% data capture~~	~~25 to 50% data capture~~	~~Less than 25% data capture~~
Passive Monitoring – Bias Adjustment Factor	Bias adjustment undertaken as normal	~~<25% impact on normal number of available bias adjustment colocation studies (2020 vs 2019)~~	~~25-50% impact on normal number of available bias adjustment studies (2020 vs 2019)~~	~~>50% impact on normal number of available bias adjustment studies (2020 vs 2019) and/or applied bias adjustment factor studies not considered representative of local regime~~
Passive Monitoring – Adherence to Changeover Dates	Defra diffusion tube exposure calendar adhered to	~~Tubes left out for two exposure periods~~	~~Tubes left out for three exposure periods~~	~~Tubes left out for more than three exposure periods~~
Passive Monitoring – Storage of Tubes	~~Tubes stored in accordance with laboratory guidance and analysed promptly.~~	Tubes stored for longer than normal but adhering to laboratory guidance	~~Tubes unable to be stored according to be laboratory guidance but analysed prior to expiry date~~	~~Tubes stored for so long that they were unable to be analysed prior to expiry date. Data unable to be used~~
AQAP – Measure Implementation	Unaffected	~~Short delay (<6 months) in development of a new AQAP, but is on-going~~	~~Long delay (>6 months) in development of a new AQAP, but is on-going~~	~~No progression in development of a new AQAP~~
AQAP – New AQAP Development	Unaffected	~~Short delay (<6 months) in development of a new AQAP, but is on-going~~	~~Long delay (>6 months) in development of a new AQAP, but is on-going~~	~~No progression in development of a new AQAP~~

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Local Air Quality Management Technical Guidance LAQM.TG16. April 2021. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG16. May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- AEA Energy & Environment (Feb 2008) **Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users Issue 1a**
- AEA Technology (2005) **Local Site Operators' Manual**
- **Air Quality (England) Regulations 2000 (SI 2000 No. 928),**
- **Air Quality Standards Regulations 2010 (SI 2010 No. 1001)**
- Department for the Environment, Food and Rural Affairs **Clean Air Strategy 2019**
- Department for the Environment, Food and Rural Affairs (February 2018) **Local Air Quality Management Technical Guidance LAQM.TG (18))**
- Department for the Environment, Food and Rural Affairs (2007) **The Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007**
- **The Air Quality (England) (Amendment) Regulations 2002 (SI 3043)**
- **The Pollution Prevention and Control Act 1999**
- **Nottingham City Council (2000 - 2019) LAQM Review and Assessment Reports:**

http://www.nottinghaminsight.org.uk/f/63682/Library/Environment/Air-Quality/

- **Nottingham City Council**

  Health and Wellbeing Joint Strategic Needs Assessment:-

  Air Quality and Health 2015 and 2019
- **DEFRA Clean Air Strategy 2019**

Nottingham City Council Website **http://www.nottinghamcity.gov.uk**

Nottingham's geography and weather.

A location's air quality is affected by both local and distant emissions, from a wide range of sources, seasonal and day-to-day weather conditions, and the prevailing wind direction.

Nottingham's location in England means it does not experience daily coastal sea-breeze effects and is therefore subject to the wind direction of the air masses moving across the UK. The wind rose (Figure 9 is typical of data measured at Watnall meteorological station on the western edge of the Nottingham conurbation) shows the wind direction with the greatest frequency as the large lobe at 220^0. This 'prevailing wind' direction is roughly from the southwest. Thus, Nottingham's air quality is significantly influenced by sources ranged in an arc from the west-south-west to the south-south-west.

Fig 9: Nottingham City Council's geographic location in England and example Windrose (Watnall)

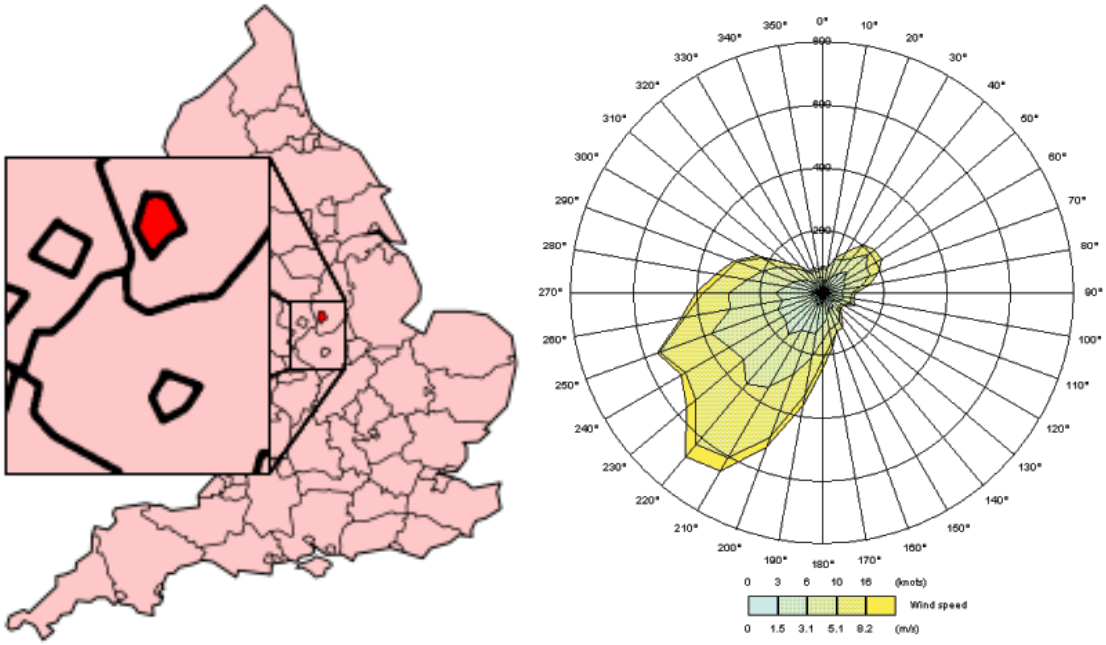
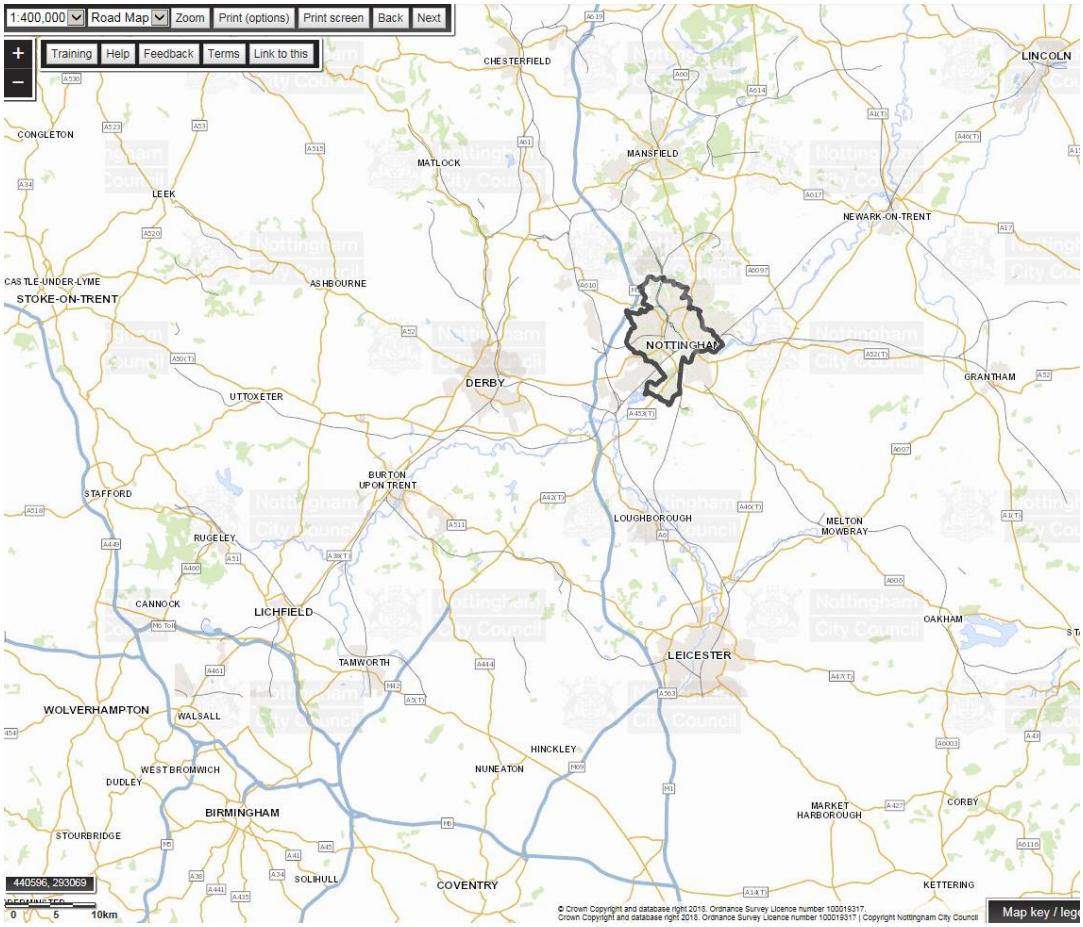


Fig 10: Nottingham City Council's geographic location (detailed)



Nottingham is surrounded by agricultural land, the M1 motorway bounds Nottingham to the west, and the very large urban industrial conurbation of the West Midlands is approximately 40 miles to its southwest (Fig. 10). Emissions from agricultural activity outside the conurbation as well as those from closer and more distant domestic, commercial, industrial and transport sources outside Nottingham contribute to the levels of NO2 and particles measured in Nottingham.

When carrying out air quality modelling it is necessary to quantify and include the contribution these distant and local sources make to modelled concentrations.